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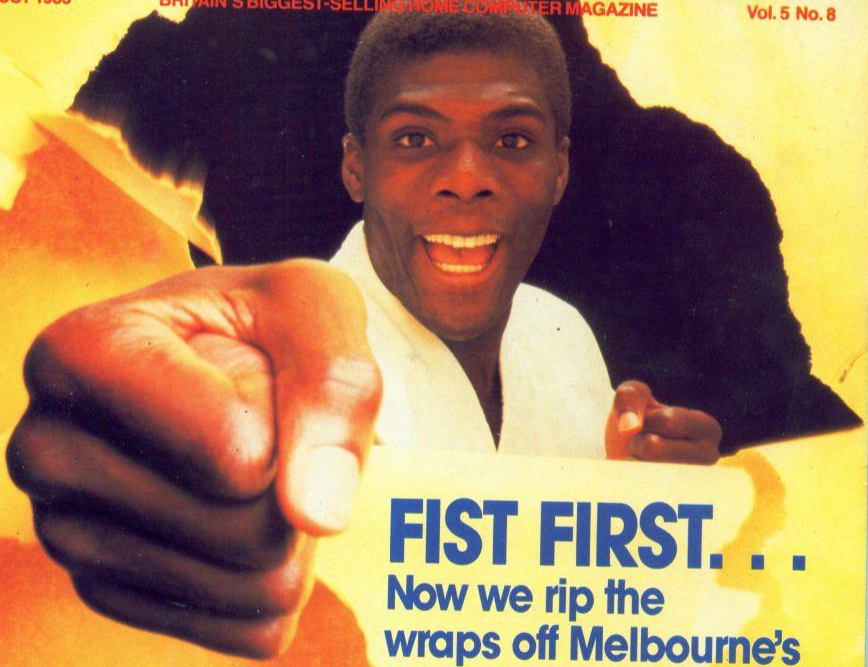
AUGUST 1985

BRITAIN'S BIGGEST-SELLING HOME COMPUTER MAGAZINE

Vol. 5 No. 8



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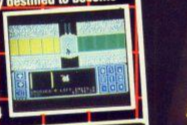

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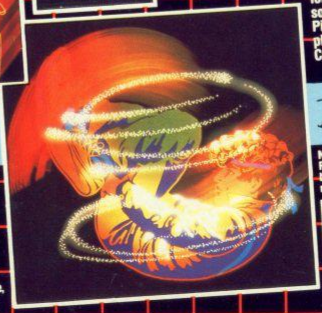

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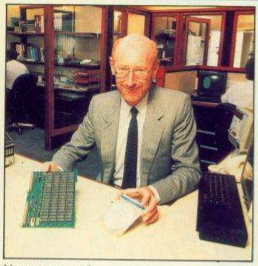
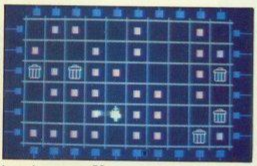
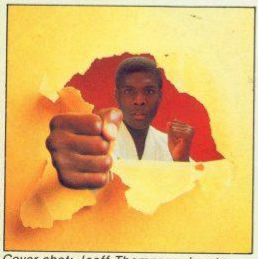


News: page 12.



Impulse: page 58.

Charlie Chan: page 62.



Cover shot: Jeoff Thompson, karate world champion. See First Fist Then . . ., page 40.

12 NEWS: Mirror man Maxwell takes over Sinclair; Judge calls Amstrad pirates; Acorn suspended; Robot umpires; Datasoft's Goonies — next Ghostbusters?

19 YOUR LETTERS: Plus 4 comments, software observations, "Enterprise is wonderful", Dismon information and what's happening at Evesham?

23 HARDWARE HITLIST: Talking heads — face-to-face interview with Anirog's Voicemaster; plus an ode to a Pace Nightingale modem.

25 SOFTWARE SHORTLIST: The Way of The Exploding Fist gets five-star treatment; and sneak previews of Sky Fox from Ariolasoft and US Gold's Kennedy approach.

32 JOYSTICKS AWAY: Pete Connor straps on his goggles and wiggles, rolls, presses and jerks his way through a variety of sticks, tracker balls and cards.

37 COMPETITION RESULTS: At last it can be revealed: which one of the oleaginous mass of sneaks, cheats, slackers, and goof-offs won our "Cheat" competition.

39 JOYSTICK COMPETITION: Over £600 worth of prizes to be won. There are 50 Sticks — the baseless mercury switch joystick — up for grabs.

40 MELBOURNE HOUSE — FIST FIRST: The Way of the Exploding Fist is just the first salvo in a veritable barrage of good games promised by Melbourne.

44 TOP TEN GAMES COMPETITION: What would you play on your desert island? Name your top ten games of all time and you could win a Commodore CBM-128.

46 THE QL REVISITED: A quantum leap to nowhere? John Dawson boards the silent hulk floating in the depths of space to reassess the potential of the QL.

51 QUEST CORNER: Hugo North has a good laugh with Bored of the Rings, dabbles in assassination, and follows the trail of the Wing in Tracer Sanction.

52 SPECTRUM BIRDY: Tough times for Jovian avians — this challenging machine-code game illustrates the problems of collecting diamonds on Jupiter.

58 COMMODORE 64 IMPULSE: Floyd the Droid can't help acting on impulse — he has been miniaturised to track down chip defects in Keith Suddick's new game.

62 ACORN ELECTRON CHARLIE CHAN VISITS THE WOK FACTORY: Plenty of chopsticks but nothing to put the rice on. B Lewis lashes out the monosodium glutamate.

66 AMSTRAD FRUITIE: Hold, nudge and gamble with M K Mostowy's classy simulation of a penny arcade fruit machine. Penny arcade? Those were the days.

68 SPECTRUM CHORDATA: Chuck away that cardboard Strat and get down to business. Dave Rogers' has a program that helps angst-ridden guitarists fret properly.

72 AMSTRAD SPLIT: J G Fountain introduces you to split-screen techniques. Let's hope it does for the Amstrad what it did for Bette Davies.

74 SPECTRUM HATCHED FILL: If you want to lower the tone of your graphics, or heighten the contrast, A J Renton fills you in on the details.

76 COMMODORE 64 SPRITES: Master interrupts are one of the most important aspects of machine-code programming on the 64. Learn from the master, Nalin Sharma.

78 COMMODORE 64 STRINGS: You get a number of sub-routines to manipulate strings with this educational article from Graham Barbour. All this and bubble sorts, too.

80 BBC INTERRUPTS: Fintan Culwin follows up on last month's music editor. Now how to accompany games.

84 TELSOFT: A reminder of how to use this useful service.

87 FIRST BYTES: Pythonesque pokes, a look at discs and bluffers guide.

91 RESPONSE FRAME: Tim Hartnell helps readers with queries.

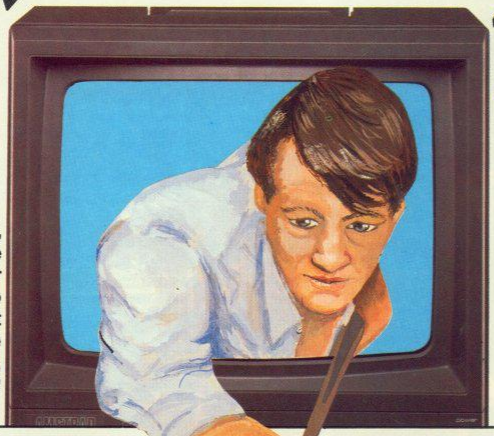
93 SOFTWARE FILE: Nine pages of programs for a wide range of home micros.

106 DATEBASE: Paul Bond rounds up local, national and international micro events and supplies a list of essential phone numbers.

Cue up for these new versions of classic snooker and pool for Amstrad computers!

Hurricane

Snooker & Pool



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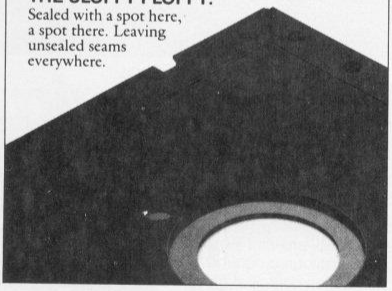

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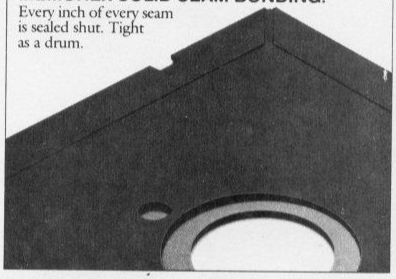

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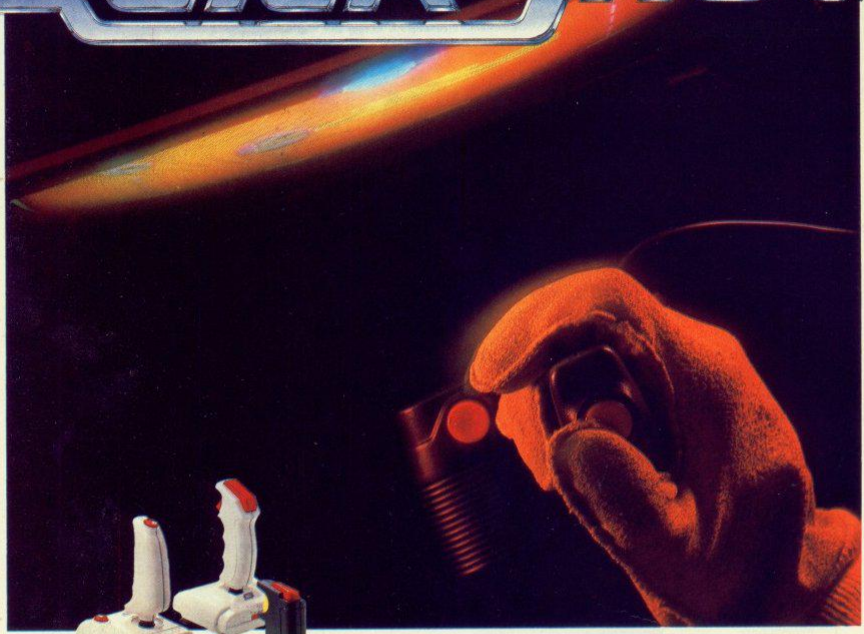

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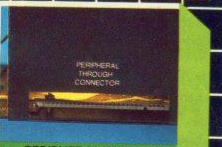

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CZECH MATE ON SINCLAIR'S BOARD

"I AM ABSOLUTELY DELIGHTED. Robert Maxwell is a really great bloke". That's Sir Clive's gushing reaction to the financial saviour of Sinclair Research. But just how the computing public will react to a Sinclair Research without Sinclair himself in charge and still pushing the buttons is another matter. After all, with Sir Clive only acting as a research and development consultant, how can the company ever be the same again?

The enthusiasm of Sinclair's creditors may also be qualified. They'll be pleased to see some money coming their way, but disappointed at the lack of new orders. As a result Timex has already laid off 400 workers from its Dundee production line where so many Spectrums have been built.

Sinclair Research must create new products if it is to have a long-term future. The fact that the company doesn't seem to be producing more of its existing computers is understandable. At the current rate of sales, the £34 million of warehouse stock that Maxwell has inherited should see the company into the autumn — and, pessimistically, even beyond that.

If the new Sinclair does try ploughing on into 1986 with old machines the company will cease to exist: Sinclair without innovation isn't Sinclair.

Worse, the whole industry without a steady flow of increasingly sophisticated computers will also flounder. This year for the first time it is the software houses and not the computer manufacturers who have been making all the running. They've been the ones to come up with the new ideas that keep the industry going.

But that can continue for only so long. Once they run up against the limits of machines which in most cases are several years old, there will be nothing to sustain the public's interest.

Clive Sinclair's outburst of delight at the Maxwell take-over shows his relief that the company he made great will continue to exist. Maxwell in turn must recognise the importance of Sinclair's continued participation in the firm's and the market's future.

Provided he capitalises on Sinclair's talents there may still be a British home-computing manufacturing industry for Acorn to return to when and if it staggers to its feet after its second knock-out in four months.

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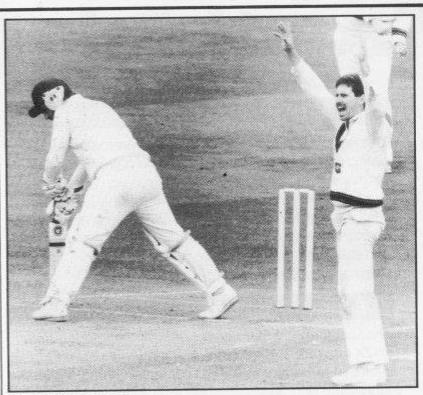


Was he leg before?

ROBOTS — HOWZAT?!

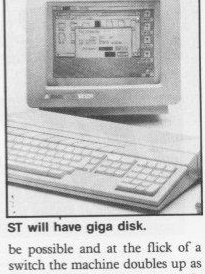
DICKY BIRD is not going to be replaced by a Dalek yet but micros could soon be helping umpires with tricky leg before wicket decisions. The Test and County Cricket Board is sponsoring research into using cameras linked to a computer to plot the probable course of the ball after it has hit someone's pads which would indicate to the umpire whether it was plumb or not.

The idea comes from Jodrell Bank Radio Astronomer and cricket fanatic Sir Bernard Lovell whose last idea for an electronic aid to show whether catches behind the wicket came off bat or pad is still at the prototype stage. This was a microphone in the bat itself — well Australian T.V. puts a mike in the stumps — with headphones for the umpire. So far Sir Bernard's most successful electronic cricketing innovation is an improved light meter used at Old Trafford.

500,000,000K

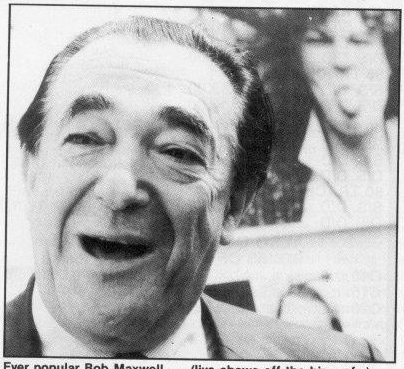
LASER MEMORY could be in our homes before Christmas. By then Atari's Rob Harding expects to be selling a Compact Disc Rom Player for the ST with a capacity of half a Gigabyte per disc — that's 500 Megabytes, enough to swallow every telephone directory in Britain — and for a price of less than £500. The only catch is that the CD Rom is read only — the technology to write to laser discs is still prohibitively expensive.

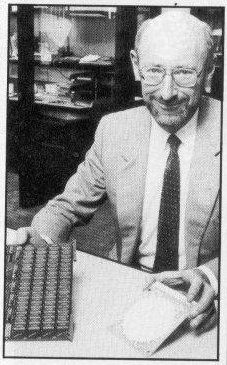
At the Chicago Consumer Electronics Show Atari demonstrated the CDRP player with a disc containing an entire 15 volume encyclopaedia. The text only took up a third of a disc with pictures and a comprehensive index filling the rest. Arcade-style laser games will be possible and at the flick of a switch the machine doubles up as an ordinary compact disc music player.



ST will have giga disk.

SINCLAIR COUP
Bob's your uncle, Clive





Ever popular Bob Maxwell — (live shows off the big wafer).

SIR CLIVE is back at the drawing board now that *Daily Mirror* owner Robert Maxwell is paying £12 million to take over Sinclair Research. Desperate financial trouble had led the Bank of England to try to organise a rescue, but Sinclair is still not safe.

Timex has laid off 400 Spectrum Plus assembly workers because there are no more orders and the future of the pocket television looks shaky, because Polaroid has stopped making the long life lithium batteries for it. When the stockpile runs out Sinclair will switch to short life Zinc Carbon batteries.

Maxwell is looking for a new chief executive now that Sir Clive, who admits he is "awful at managing established businesses", has left the board to concentrate on research. Paradoxically his Metalab announced a breakthrough in wafer scale integration just days before the Maxwell deal.

The problem with conventional chip production is that on each wafer of silicon some chips are faulty so you cannot produce a complete computer on one slice. Metalab uses Ivor Catt's idea of configuration logic — a built-in circuit which checks and bypasses any faulty areas on the wafer.

AMSTRAD PIRACY DOUBLE-DECKER

SELLING A high-speed twin-cassette stereo deck which could be used to copy pre-recorded music or program cassettes was an inducement to infringe copyright according to Mr Justice Whitford in the High Court. The case is doubly embarrassing to Amstrad which makes the decks because it also supplies commercial software through its Amsoft operation.

Despite legal costs of £100,000 Amstrad intends to appeal against the ruling which was in favour of the British Phonographic Industry who are now seeking damages from Amstrad. According to BPI's legal adviser Patrick Isherwood high-speed twin cassette decks will only be allowed to be sold if "accompanied by adequate warning notices about the copyright infringement — notices so explicit that they are likely to make the machines unattractive to the retailer".

Sugar "condemns piracy".

If the ruling stands it could be used by organisations like the Guild of Software Houses and the Federation Against Software Theft to take action against companies like Evesham Micros which makes the Interface III program copier (Don't Touch, page 14, *Your Computer* July 1985). Roger Tuckett of FAST has called Justice Whitford's ruling "a welcome development".

Meanwhile the new copyright law has encouraged MicroPro — who wrote Wordstar — to look for a test case immediately.

Wally's paradise is a 64K Spectrum

MIKRO-GEN'S latest box of tricks will turn software pirates into a bunch of wallies — and also give Mikro-Gen's own programmers almost 50 percent more memory to work with.

The Mikro-Plus Interface for the Spectrum is like Imagine's much talked about idea for Megagames. It's a hardware way of selling software. You pay £14.95 for a game on Mikro-Plus which overlays the Spectrum's Rom and includes a joystick port. The game itself won't be copiable because part of it is burnt into the Mikro-Plus's 16K's worth of Eproms. The rest of it comes supplied on cassette.

Shadow of the Unicorn, a role-playing adventure with 10 characters, will be the first program supplied on the cigarette-packet sized Mikro-Plus and will be out in mid-September. Mikro-Gen's new Wally game for the Christmas period, Three Weeks in Paradise, is not only a change in style but will also be appearing on Mikro-Plus Interface.

Booked — FBI pulls the Cracker

"I WAS a teenage hacker" confesses Bill Landreth, alias The Cracker, in *Out of the Inner Circle*, a newly released Penguin book he wrote while on probation after the FBI finally caught him after a lifetime of computer crime at the grand old age of 19 while tapping into Telemail which serves NASA, Coca Cola and General Motors.

Big Blue screen blur

SORE EYES? Nagging headaches? You could be another victim of VDU health hazards. The good news according to a comprehensive report on the subject put together by IBM is that extra metal shielding could cut out the problem. These shields are already a requirement in the States but not as yet in the U.K.

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DIARY

RICHARD AUSTIN of Evesham Micros wants to thank GOSH and FAST "for their outburst against our product, Interface III, in July's *Your Computer*. He claims he is crying into his champagne as he celebrates the success of his product.

IT'S BEEN a bad few weeks for computers and robots. First there was the slight hitch with President Reagan's Star Wars extravaganza when the space shuttle insisted on looking for a 10,000 mile high mountain to make the laser test a little easier. Then an Edinburgh restaurant refused to pay for a Donic robot which it had bought second hand after it allegedly went beserk knocking over tables before its head fell off into a customer's lap. Now a Naughty Words Editor to stop people like the man who wrote the Amsdisk program — he sends his sincere apologies by the way — from filling up bulletin boards with obscenities has gone out of control. All messages including the word title are being censored.

ALAN SUGAR produced a bird watcher who makes recordings of wild life noises and copies them for friends, as an example of the typical tape-to-tape cassette user in the Amstrad double-decker piracy trial. The judge was not impressed.

SAD STORY from Brian Raine who went to Bournemouth Computer Club clutching his copy of *Your Computer* and complained that "piracy was the main activity". He was laughed at and the leader of one user group admitted that he asks his 8 year old daughter to make copies for him to avoid prosecution. Brian wants GOSH to guarantee that they will replace faulty tapes — in case software houses go bankrupt.

SOME TRANSPARENCIES from Datasoft disappeared before we saw them — Ah said Datasoft "that's because we put in a fake doubloon — somebody must have thought it was real". We are looking for a tall, one-legged man with a parrot on his shoulder . . .

Elsie Dee

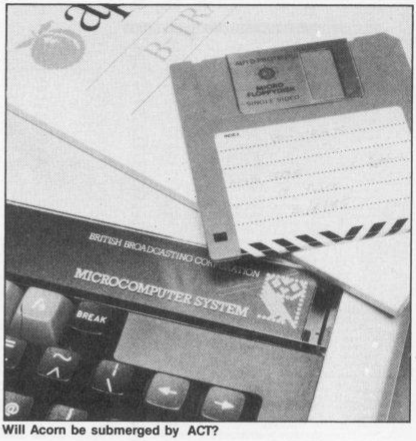
DOWN AGAIN

Acorn's second problem

ACORN'S CRISIS has deepened with the suspension for the second time of its shares, which had sunk to 11p on the Stock Exchange. At the same time Junior Industry Minister John Butcher wants an end to Acorn's exclusive and lucrative BBC contract to let companies like ACT in.

According to Close Brothers — Acorn's financial advisers — "the market for home and small personal computers has become even more difficult and a further and very substantial decline has occurred in sales from the levels predicted earlier this year. This has led to a significant deterioration in the financial position of Acorn". Two weeks earlier ACT, which is muscling into BBC country with its 16-bit F1E micro, announced it had made record £92 million sales and £10 million profit.

With home computer sales running at one third of last year's in some areas Acorn finds itself sitting on a stockpile of at least 70,000 Electrons while the BBC Plus is still not selling despite a panic £30 price cut. Olivetti, which bought 49.3 per cent of Acorn the last time it needed rescuing, could increase its stake to a majority and sell off Acorn subsidiaries like Acornsoft.



Will Acorn be submerged by ACT?

One industry analyst points out that with sales of nearly £2 billion a year "Acorn is less than petty cash to them" but if high-flying ex IBM troubleshooter Alex Uboldi, who has been put in as emergency Managing Director, cannot quickly find a new strategy for Acorn's survival then Olivetti may pull out. Acting Chairman Alex Reid may have had his spaghetti.

FREE MODEM WITH DRIVE

COMMODORE IS about to dump £20 million worth of kit on the market at half price but most of it seems to be business machines. Meanwhile general manager Nick "smile at the rain" Bessey claims he can maintain the price of the 64 and "break the seasonal stranglehold which has dogged the home computer industry".

Good offers on peripherals include 1541 disc drive, with disc software, plus modem and one year's Compunet subscription for £229.

Despite the launch of the CBM-128 in September Bessey says the 64 will continue through 1986. Certainly software and peripheral makers are sticking with the Commodore 64.

Graphics Mouse expands 64.

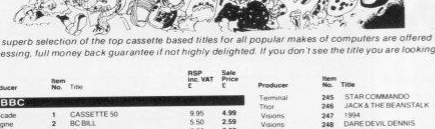
Commodore's own Sound Studio and Sampler programs for the 64 come out at the same time as Activision's Music Studio, and Datex is showing the M/S 1 Graphics Mouse which purports to give the 64 Macintosh style graphics — at lower resolution but in colour.

If your name is MUD it's for you

BRITISH TELECOM turns dungeons and dragons into big business next month with the launch of its Multi-User Dungeon which will allow anyone with a modem and £20 to join "the largest interactive computer game in the world". MUD can accept over 100 simultaneous players and a permanent Arch Wizard will watch out for foul play.

MUD will operate from 6.00 pm to 8.00 am and all day at weekends. Originally written by Roy Trubshaw and Richard Bartle, MUD can still be played in the early hours on the Essex University Dec computer, but the BT version claims to be bigger and better.

SOFTWARE



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UPDATE

FIRST YOU RELEASE a good version of your game on say the CBM-64 to get rave reviews then you produce third rate conversions for other machines relying on lazy journalists not to even open the packaging before repeating what they wrote about the original. A monstrous libel on all concerned so here's an update on when you can expect to see other peopel's hits on your micro. Firebird has its **Gyron** team writing Z-80 **Elite** up in Edinburgh. Expect Spectrum **Elite** in September and Amstrad in October. Rumours abound that Firebird was so impressed with the shaver — sorry, Acornsoft that it wants to buy the company for a million pounds — but will they have enough credits left to buy a military laser? Meanwhile Elite — as in the software house not the game — hopes to produce Spec 'n Am versions of Commodore's **International Soccer/Basketball** soon. Beyond is stressing that its Spec version of **Spy vs Spy** "features identical graphics to the Commodore". End of August sees Mirrorsoft's **Boulderdash** on Am. A&F's **Chuckie Egg II,** originally Spec, is moving through CBM-64 and Am onto other micros. Another sequel, Task Set's **Super Pipeline II** is going Spec. CRL who proudly call themselves the Dream Makers have made it to the Amstrad with **Rocky Horror.**

RUSS ABBOTT has been seized by the BBC and the only way that Basildon Bond and the rest of the Madhouse team can rescue him is by getting jokes right to unlock the doors in Probe Software's new View to a Kill lampoon . . . Rupert and the Toymakers' Party paves the way for Quicksilva to follow up with The Flintstones and Max Headroom . . . 666 Go to Hell now has a rival in Witchswift from English Software while Five Ways Software wants to unleash a plague of Rats . . . Monster Trivia tests you on 2,000 Trivial Pursuits type questions . . . Nick Faldo Golf from Mind Games is icon driven . . . Dinamic in Spain wanted to call its Frank Bruno Boxing rival Rocky but has had to settle for Rocco . . . System 3's Karate will join combat with Fist and U.S. Gold's Karateka.

ON YER BIKE

Activision's Tour de force

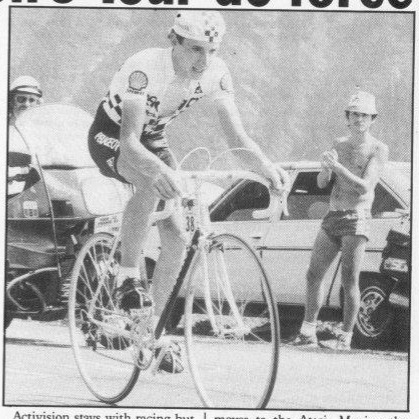
GREG FISCHBACH brought his family over from California to Britain for the Summer. They're still looking for it.

Greg, International President of Activision, is also looking for a new U.K. chief now that Geoff Heath has left for Melbourne House.

Greg's links in the entertainment industry — he has managed the Steve Miller Band amongst others — helped him snaffle the rights to Ghostbusters which contributed to Activision's $27 million game sales last year.

Now he gets an early glance at movie scripts but he doesn't believe "that every motion pictures is capable of being turned into home comuter software. What a game needs is hooks."

His next releae is Tour de France by Byron Turner, a cycling game endoresed by the Tour, Peugeot and king of the mountains Robert Miller. Flying Scot Bob might not be so happy if he knew Greg referred to him as "the English bicyclist".



Activision stays with racing but moves over to four wheels with the Great American Cross Country Race which starts on the 64 and moves to the Atari. Moving the other way is the long-awaited CBM-64 version of Rescue on Fractalus — out August.

SON OF BLUE MAX MEETS GOONIES

Frankie's manager takes control.

SO BIG has the U.S. Gold/Ocean/Centresoft combine become that it seriously discussed taking over Sinclair when Sir Clive hit trouble. With over a quarter of the games sold in this country coming from the group already plans are in hand for a massive Autumn offensive to take more of the market. U.S. Gold will be launching sequels to proven hits — Beachhead II, Blue Max 2001 and Solo Flight II in August and Pole Position II in October — all on the 64 to start with.

Goonies — based on the Spielberg film just released in America and tipped as the next Ghostbusters — is also due in October, with Zorro due the month before. Raid Over Moscow on Amstrad paves the way for CPC versions of Dambusters and Bruce Lee later. Ocean is happy with the live audio track of Relax on its Frankie Goes to Hollywood program for the 64 and Spectrum and now plans Atari and Amstrad versions.

Ocean has also signed up Japanese computer game wizards Konami — who produced the original Scramble back in '81 — to sell Konami titles under the Imagine name.

The first of these is Hyper Sports — a suitable name for the original Imagine operation before it was resuscitated by the U.S. Gold/Ocean/Centresoft combine. Next Konami/Imagine launch will be Yie Ar-Kung Fu which will find itself competing with U.S. Gold's Karateka in the martial arts battle.

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● **'The Typing Master'** is not a toy. It is a professionally-written program which has as its sole purpose the teaching of typing/keyboard skills in a way that is friendly and fun. It was written by a typing instructor and it has been marketed world-wide on CP/M, MSDOS, PCDOS and other operating system-based machines over the past three years. It has also been available on Newbrain and BBC Micro (Model A or B) for over a year and is now being released for Amstrad CPC (mono or colour), Commodore 64 and Sinclair QL!

● TAPE formats of the Basic version are available from the following selected list of distributors (media and prices are shown in brackets).

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GFG Microsystems, 36 Armitage Way, King's Hedges, Cambridge, CB4 2UE. Tel. (0223) 315120.

BBC MICRO (model A or B) (Cassette, usable with disk: £15.00+VAT)
AMSTRAD CPC (mono or colour) (Cassette: £15.00 + VAT).
E.C.H. Hobday, The Chestnuts, Rodmersham, Sittingbourne, Kent ME9 0PL. Tel. (0795) 24191.
COMMODORE 64 (Cassette: £15.00 + VAT).
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4	Booty	Firebird	Sp
5	Softaid	Etheopia Appeal	Sp
6	Grand National	Elite	Sp
7	World Series Baseball	Imagine	Sp
8	Herberts Dummy Run	Microgen	Sp
9	Quackshot	Creative Sparks	Sp
10	Dambusters	US Gold	64
11	Starion	Melbourne House	Sp
12	Arnhem	CCS	Sp
13	Wild Bunch	Firebird	Sp
14	Star Strike	Realtime	Sp
15	Rocky Horror Show	CRL	Sp
16	Everyones a Wally	Microgen	Sp
17	Broadstreets	Argus	Sp
18	Dragontorc	Hewson	Sp
19	Gremlins	Adventure Int	Sp
20	Death Star Interceptor	System 3	Sp

Sp = Spectrum 64 = CBM 64.
Source = WH Smiths.

TOP 3 BY MACHINE

1	R.I.P.	M. Tronic	Vc
2	Rockman	M. Tronic	Vc
3	Mickey the Brickey	Firebird	Vc
1	Way of Exploding First	Melbourne House	64
2	Drop Zone	Centresoft	64
3	A View to Kill	Domark	64
1	A View to Kill	Domark	Sp
2	Dun Darach	Gargoyle	Sp
3	Action Biker	M. Tronic	Sp
1	Overdrive	Superior	El
2	Classic Adventure	Melbourne House	El
3	Football Manager	Addictive	El
1	Alien 8	Ultimate	Am
2	Ghostbusters	Activision	Am
3	Fighter Pilot	Digital Ing.	Am
1	Ghostbusters	Activision	Ms
2	Flight Path	Anirog	Ms
3	Chuckie Egg	A & F	Ms
1	Atik Atak	Ultimate	Bc
2	Revs	Acorn	Bc
3	Lode Runner	S. Projects	Bc
1	Quasimodo	C. Soft	At
2	Ghostbusters	Activision	At
3	Fort Apocalypse	US Gold	At
1	Dorks Dilemma	Gremlin	16
2	Dark Tower	Melbourne House	16
3	BMX Racers	M. Tronics	16

Vc = Vic 20 64 = CBM 64
Sp = Spectrum Bc = BBC At = Atari 16 = CBM 16 El = Electron
Am = Amstrad Ms = MSX.
Source = Websters Software.

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WHY NOT BACK—UP?

I FELT COMPELLED to write to you after reading your News item entitled "Don't touch — Software industry at risk" in the July '85 issue of *Your Computer*. This article referred in particular to Evesham Micro's Interface 3 which from what I can gather allows all commercially available Spectrum software to be transferred to Microdrive but it's implications were applicable to every back-up utility released for any micro.

I appreciate the concern felt within the software industry for the sort of organised software piracy rampant today but the opinions expresed in the article seemed to me to be just a touch one sided. Especially the comment by Mr. Langdell of the Guild of Software Houses who believes that there is no such thing as an "innocent" copy. Is he categorically stating that when I transfer my tape based programs to disc for more convenient use I am guilty of a crime? That's what it sounds like to me! I find his comments not only ill-informed, but also deeply offensive.

Cassette tape is an inefficient medium for storing computer data, it is slow and unreliable, and despite Mr. Langdell's protestations to the contrary, subject to deterioration with time. Unless you are prepared to fast-forward and rewind your tapes every few weeks as a matter of routine, print-through (caused by long-term proximity of data on the closely wound tape) may produce data corruption, thus rendering the tape useless.

I am not suggesting that this will happen inevitably, but it is a very real risk, particularly with so-called "fast loaders" where the frequency of bits is so much higher, and the computer is pushed just that little bit further to read the tape. It is perhaps lamentable that even in 1985, the vast majority of UK home computer users still rely on tape for software and data storage, and now that alternative storage media is beginning to gain wider usage in this country it seems that there are people wishing to prevent us from making full use of them, for until disc (and Microdrive) based commercial software becomes the norm it will still be necessary for the serious home user to back his/her tapes up on to disc.

You may well condemn the producers of back-up utilities but if I might just present an analogy: If I were to buy Paraquat from a gardening supplier's shop and subsequently used it to murder my mother-in-law, would the shopkeeper be guilty of my crime? Certainly not! Back-up utilities in this era of elaborately protected software are an essential commodity. It is not the manufacturer of these utilities at fault, rather it is a small minority of ill-principled individuals who put them to perverted use, giving the rest of us a bad name.

May I ask how the Computer Copyright Bill, once law, is going to be policed? Will my name go onto a police computer (possibly backed up onto the odd disc or two . . . tut tut!) as a known computer addict and will I then have to live in perpetual fear of midnight raids by the crack Hack Squad?

I'm afraid that no amount of irrational pontificating is going to prevent me from making as many back ups of software as I wish. It's for my own use, I don't compute for profit, I do it for my own pleasure. I am not a criminal. Possibly Mr. Langdell would like to see the manufacturers of fast mass storage devices go out of business instead.

Rob Baxter,
Manchester,

NEW ROUTINES

SPECTRUM OWNERS may like to use some of my routines.

```
POKE 23659,0
```

Makes the Spectrum crash if anything is printed in bottom part of the screen. e.g. error messages or breaks. (To disenable this routine use POKE 23659,2)

```
PRINT USR 0
```

Completely clears the memory. (New only clears the Basic)

```
9000 FOR f=1 to LEN a$:PRINT A$(f);:BEEP .05,0:NEXT f:RETURN
```

Prints text newsflash style. It is meant to be used as a sub routine. To activate use LET a$="message to be printed.", then set the printing variables e.g.

```
PRINT AT x,y;
and GOSUB 9000
```

I have noticed that the Spectrum has a facility to convert binary numbers to decimal but it doesn't have anything to convert decimal numbers to binary, so I have written a routine to serve this purpose. Poke the decimal number that you want to convert into location 16384, then run this routine:

```
1 LET a$=" ":FOR f=0 to 7:LET a$=a$+STR$(PEEK(f,175):NEXT f:PRINT a$:STOP
```

Neil Braganza,
Nailsea,
Avon.

DISMON

IN THE June issue of *Your Computer* you published a program and accompanying article about my Dismon machine code monitor. Unfortunately, you accidentally left out quite a large section, describing the 'E', 'F' and 'G' commands.

E ssss: Allows you to Enter Ascii

(continued on page 21)

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IN ★ TOUCH

How to write for *Your Computer*

We called this magazine *Your Computer* precisely because we welcome your views, tips and hints and even your criticisms of machines and software in general. Here's how you go about getting your name into print. Your article should be typed, double-spaced, on A4 paper. A name and address on each sheet would help. Don't forget to tell us which machine it runs on. With programs please include a cassette or disc and some indication of how long it is. Please put what machine it's for on the envelope. Don't forget full instructions to us how to load and list your program and how to enter it for the readers.

The article must be submitted exclusively to *Your Computer*. We pay £35 per published page — that's as it appears in the magazine and includes illustrations.

Telsoft

Telsoft is *Your Computer's* software downloading service. Any program for the Spectrum or the BBC — and soon the Commodore — which has a telephone symbol next to it is available on the service. Both 1200 and 300 baud speeds are catered for. For more details call Colchester (0206) 8068. No more lonely nights typing in endless pages of hex digits.

Message service

You can get messages to us in two ways. Either use the Prestel Telex Link to 892084 BISPRES G or you can use our very own modem, day or night on 01-661 8978. The modem is V21, 300 baud, even parity, 10 bits per character. You simply transmit in upper case "YRC" — our address code, and wait for the acceptance code "+ + + STF GO". Then off you go. Don't forget to tell us who it's for. Sign off with "NNNN" — again in upper case.

(continued from page 19)

text into memory from ssss onwards. Ascii text and control characters are entered from the keyboard — delete removes the last character, replacing it with a zero byte. This mode is terminated by pressing Stop in which case it displays the address of the next character that would have been entered, for use when appending.

F ssss eeee bb bb . . . . . : This finds all occurences of the one to seven bytes specified, within the given address range. Any byte can be ignored by typing ** in place of the byte value. The bytes may also be specified as the Ascii value of a character by preceding the character with an apostrophe.

F ssss eeee bb bb bb — bb bb bb: This form of the Find command allows you to search for the given sequence of bytes and replace every occurence with the second sequence. As in the first form, a byte specified as ** will leave the original contents of the memory intact.

Note — The address of all matches found is printed out. If there are many occurences then the find can be prematurely terminated by the Stop key. For example:

```
F 1000 17FF A9 'N 20 ** 18 —
    ** ** 4C ** 19
```

This finds all occurences of loading the accumulator with the Ascii of N followed by a JSR to the $18th page and replaces them with JMP's to the same relative position in the $19th page.

G ssss: Start executing machine code at location ssss.

G: Start executing m/c at location specified by the program counter.

On entry, by any method, to Dismon it saves the IRQ vector, NMI vector, Progam counter, Stack pointer, Accumulator, X register, Y register and Status register. When Going to m/c it replaces all the above registers and starts execution at the specified location. Dismon automatically re-directs the NMIV to point to itself allowing you to break out of a program and re-enter Dismon by pressing Restore. If desired, this break function can be disabled by

GN ssss and GN: Both having the same function as above. On encountering a BRK instruction during execution of a machine code program, the computer returns control to Dismon therefore BRK instructions may be inserted within a routine you are checking to help with debugging.

John Twiddy,
Wallsend,
Tyne and Wear.

YOUR Letters

ENTERPRISING

AT THE BEGINNING of March I took delivery of an Enterprise. It had taken only 10 days from the date I sent the cheque, to the day it arrived by Securicor which I don't consider to be bad going.

Before I ordered it from Zappo Computers. I had read your review of the machine which said the keyboard was poor. I had used a QL a few times and thought that the Enterprise's keyboard would be similar. It seems I was wrong, and I find it much better than the offering from Sinclair.

The graphics are superb — 640 x 512 — and although there are "only" pre-defined colours. one can define thousands using the RGB command which mixes the three primary colours.

The Basic is really outstanding, with no need to use the Poke statement. Many systems variables can be altered by using their names. For example the delay before any auto-repeat can be changed with the following.

SET KEY DELAY X — where
x is the delay

The arithmetic is very accurate, with 10 digits accuracy. Try this small program on any machine.

```
10 LET C = 9.8
20 LET C = C + 0.00001
30 PRINT C
40 IF C = 10 THEN GOTO 60
50 GOTO 20
60 END.
```

Richard Hudson,
Keighley,
West Yorkshire.

'PLUS 4 HAS MANY PLUS POINTS'

AFTER READING the review of the C128 in the June issue, I would like to make some comments about the Plus 4:

If the Plus 4 is not selling well the press is at least partly responsible. It has a good Basic which is a considerable improvement over Basic 2.0, yet straight Basic 2.0 programs will run quite happily, (with a few minor changes for colour etc.) I have run programs written for the Vic on a Plus 4, with a Screen Window to suit the Vic display.

Basic programs for the C64 run with no problems. The 1541 drive works satisfactorily with the Plus 4, transfering software is no trouble. The built-in software is adequate for many applications.

The sound and graphics commands are simple. The Plus 4 has a lot of potential for many users, including small businesses. Obviously the C128 will be an improvement but why knock the Plus 4, it's a good machine and available now.

D.E.F. Rolfe,
Byfleet,
Surrey.

TO THE TOP

THE SPECTRUM To The Top program published in the July issue of *Your Computer* will work on any Spectrum, not just the 48k Spectrum as stated.

The game should work as listed, but readers may obtain a copy of the program on cassette by sending a cheque/postal order for £2.50 to: Mr J.R.E. Wood 22 Denver Hill, Downham Market, Norfolk PE38 9BE.

BITS 'N' BOBS

K.R. Laslett's Amstrad Backup only handles programs with a Basic header. To extend its range to cope with machine code only files change line 170 to read:

```
170 DATA &A8, &22, &F3, &03,
        &2A,
        &EC, &03, &ED
```

Although the Backboogie article in the July issue claims that listing 2 automatically saves the code in listing 3 once it is entered, in fact it does not do so. When you have finished entering the hex code from listing 3 you must save it yourself with:

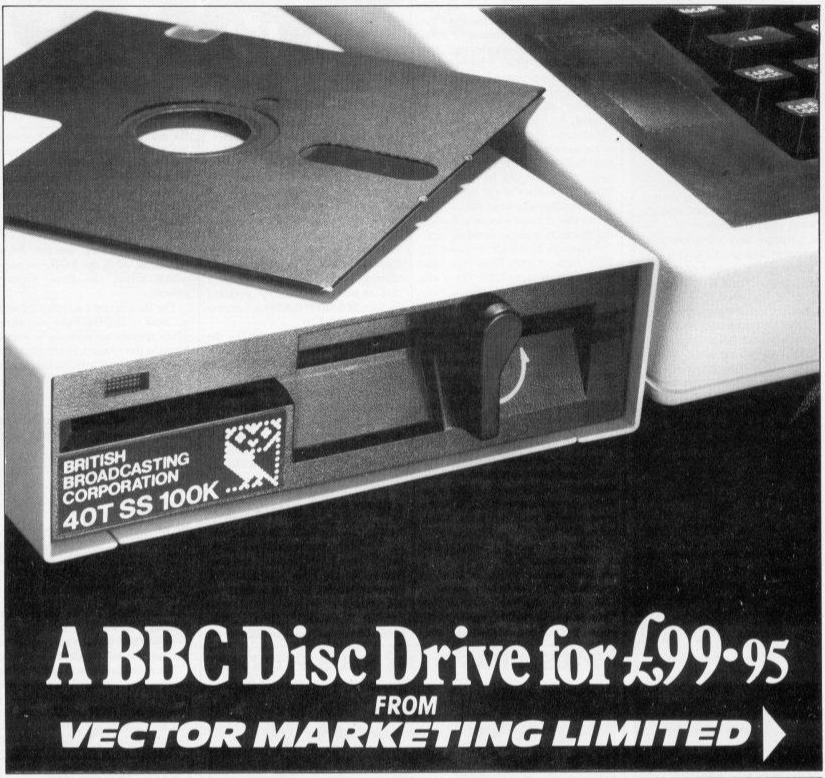
```
SAVE "BOOGIE" CODE 60148,150
```

The Load and Save commands for Spectrum Multi-Font in the June issue need to be changed before the program will work. After running listing 2 save the code it creates with:

```
SAVE "M.F.T. Code" CODE
    60928,2355
```

Now to load it back change the second statement in line 10, listing 1, to read

```
LOAD "" CODE 30464
```



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Prospect

Modem
£143.75
Interlekt Elec
A multi rate, multi standard modem, 1200/75 300 and 1200 answer or originate modes. Connects via a standard 25 pin RS232 connector. Five LEDs on the front show when the modem is powered up, on line, receiving or transmitting data. It has a loop back test mode.

Speech Synthesizer

Commodore
£24.95
Cheetah
Difficult as it may be to think of anything more irritating than a computer announcing in a loud voice that you've got it wrong, the Cheetah Sweet Talker plugs into the user port and a din plug goes into the video output socket. It has a vocabulary of 63 allaphones (speech building blocks) and various pause lengths.

Centronics interface

Commodore
£42.50
Zero Electronics
Yet another Centronics interface for the range of Commodore computers. A bit pricey, but it does plug into the serial port, and have its software in Rom, so it should be compatible with all Commodore software. Versions for most printers, screen dump software, optional 16k buffer at £14.95. Tel 0493 842023.

Control interface

Various
£100
Bowthorpe Microsystems
Do you feel inadequate whenever people say "very clever old boy, but what can you actually do with it"? Well now you can satisfy your craving to control the central heating, the burglar alarm and the cat flap all at once with this controller.

The board gives you 12 digital and eight analogue ins and 16 digital outs.

HARDWARE hitlist

Pace modem

- *BBC*
- *Pace Electronics*

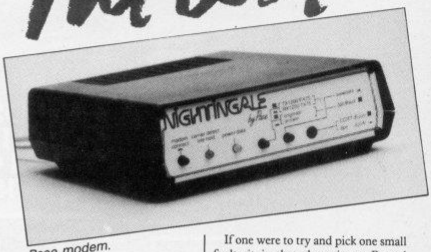
BUYING A MODEM is always a tricky task. You have to be confident that what you buy is going to be flexible enough to allow you to keep up in the ever-changing world of micro communications. Prestel, Bulletin Boards and of course Telsoft.

Pace might just have a product here which is just what you are looking for. The modem itself fits under the phone, which plugs into the back of the modem, and the modem is plugged in via a modular style BT socket. Two push buttons on the front select either 1200/75 or 300 baud originate or receive modes. An RS-423 lead plugs into the back of the Beeb and there are two indicator lights. One doubles as power indicator and data, the other shows line hold.

So far so good, not much to get excited about here. But the real strength of this package lies in the software. Commstar comes on Rom and is one of the best terminal packages around. It has two separate modes, a spooling dumb terminal mode, suitable for Bulletin boards and a page orientated mode for Prestel.

Using the terminal mode, the first thing to do is initialise the system to conform to the board's protocols you are trying to access.

You can also decide whether you want characters echoed to the screen, spooled to a buffer — memory or disc — output to the printer. If you are using a printer, it may be necessary to use XON/XOFF protocols to prevent jamming as the printer gets busy. There is a buffer output mode so that messages can be prepared off line.



Pace modem.

The Prestel mode is a little more limited. There is no printer driver included, you can use various off the shelf printer drivers. To help cope with Prestel, you can tag as many pages as you want, and then retrieve them in the order you tagged them. All the usual options such as previous page, repeat page and download program are available from the function keys.

If one were to try and pick one small fault, it is that there is no Prestel message buffer, so mailboxes have to be typed in on line. Short phrases, such as password and ID can be programmed into the function keys, but this isn't really adequate for messages.

Apart from its reliability, it hasn't crashed on me yet, its very user friendly. From the menu page, you can enter any 'star' command you like, so you can mess around with disc files and printer format, and then return to Commstar. You can even stay on line while you do it!

Further enhancements to the Modem include an auto-answer board which should be available by now, and a bulletin board disc, using the SBBS format.

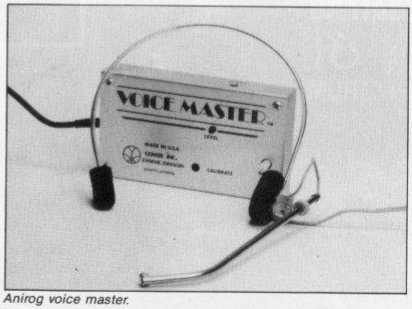
Voice Master

- *CBM-64*
- *Anirog*
- *£59.95*

THE VOICEMASTER is a rather insubstantial lump of aluminium which converts your dulcet tones into a pattern of frequency against time. This it stores away inside the Commodore's memory. The box simply plugs into the joystick port. You can record a vocabulary of words which you can then incorporate into your programs.

You can train your Commodore to recognise a vocabulary of 32 words, or, if you hum it, the Voicemaster will play it, even correcting it if your singing is, shall we say, less than perfect. The quality of speech depends on the sampling rate. The faster the rate, the better the quality, but the greater the memory required.

Generally, the words will be recognisable, but from the Donald Duck school of diction. The speed of playback can be varied, and the Voicemaster need not be connected during playback, it uses the SID chip. After a couple of training sessions, the recognition program will achieve a hit rate around 80 per cent, once you're used to it. Voice control of games might be tricky, as trying to retain measured tones in a crisis might be difficult, but it might make computers more accessible to the beginner.



Anirog voice master.

The hum-along program is amusing. It records a single melody line which you hum into the mike. This is displayed on a musical stave which can then be easily edited, printed out, saved and played back in any of the 10 preset voices available. It is a pity only one melody line can be recorded.

This is a fascinating add-on which will give hours of fun. A serious use for it might be harder to come by. It is a cheap method of incorporating speech into games. For someone interested in computer music, a true digital sampler with more specialist software is necessary.

That said, it brings into the province of the home user a field of interest formerly reserved to those with a few thousand pounds to play with.

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Yukon Yohan

by Bill Hogue

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Star chart

KEY

★ ★ ★ ★ ★ Best of its type
★ ★ ★ ★ Very good
★ ★ ★ Good
★ ★ Average
★ Below par

Bobby Charlton Soccer

BBC
DACC
Football simulation
£11.95

★ ★

It's a great idea — match-action graphics teamed up with football strategy. Unfortunately, the graphics in the DACC game aren't as good as Commodore International Soccer's or Ocean's Match Day's, and the strategy aspect isn't as compulsive as Football Manager.

First you pick the team formation and then distribute 99 skill, accuracy and stamina points to the players. You can also hand out instructions on positional play to individual team members.

Tim Love's Cricket

CBM-64
Peaksoft
Cricket Simulation
£8.95

★ ★

Every winter cricket fans cluster around radios like Ovaltine kids, listening to crackly broadcasts from the furthest corners of the Empire . . . sorry, Commonwealth. England are nearly always in dire trouble, and prayers are offered to the great umpire in the sky, for a great summer of revenge back in the old country. Summer comes and with it rain. Still not to worry, now you can play cricket in the comfort of your living room.

Tim Love's Cricket may become to cricket buffs what Football Manager is to soccer fans. It takes about as long to play, and has many similar elements. However, where Football Manager is primarily a strategic "think'em-up", this is more an arcade game.

"Flawed but fun" sums up this game perfectly.

SOFTWARE Shortlist

Way of the Exploding Fist

- *CBM 64*
- *Melbourne House*
- *Arcade*
- *£9.95*

★ ★ ★ ★ ★

THUCK! A high punch renders my opponent senseless. GRUNCH! Just as I square back up to him his roundhouse kick catches me unawares sending me sprawling. Melbourne House's Fist is the most realistic and enjoyable computer combat game yet. Even the tired and cynical hacks of the *Your Computer* office were queuing up to play it.

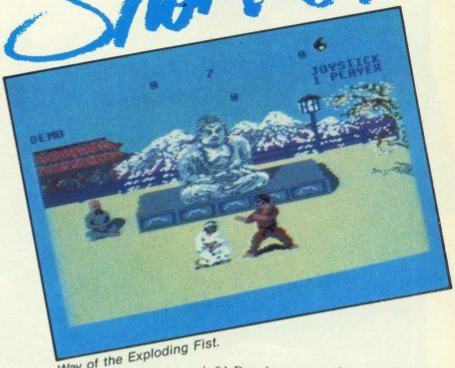
You have a choice of 18 different blows, jumps, blocks and kicks all controlled from the joystick — it sounds complicated yet the movements seem surprisingly natural and easily learnt. Against the computer-controlled karate kid waiting for it to strike then pulling its legs away with a forward sweep will take you a long way. But the game really comes into its own played between two human players.

There you need the full range of punches and kicks. A perfectly executed flying kick will bring you 1,000 points signalled by a Yin and Yang symbol awarded by the fan-toting judge but leaves you vulnerable to a whole range of counters. The sweeps along the ground which prove so effective against the computer can be smashed with a well-timed short jab kick.

Each blow that strikes home is signalled with a grunt of pain breaking in to the tinkling oriental music sound track as the victim doubles up. As you improve you need to use the forward and back somersaults to keep out of trouble and take your opponent by surprise. Each fight is played out in front of four background screens, a pagoda, lake and mountains, in a gymnasium and in front of a Buddha. Against the computer you have to twice defeat a novice at the pagoda, a 1st Dan at the lake and mountains, and progressively more difficult opponennts at each location.

Between the 3rd and 4th, and 7th and 8th Dans the program springs a surprise on you, which you can deal with by remembering the name of the game.

If this all sounds a little violent to you — at least everyone lives to fight another day and the only real hazard is flailing elbows as you and your opponent wrestle with the joysticks.



Way of the Exploding Fist.

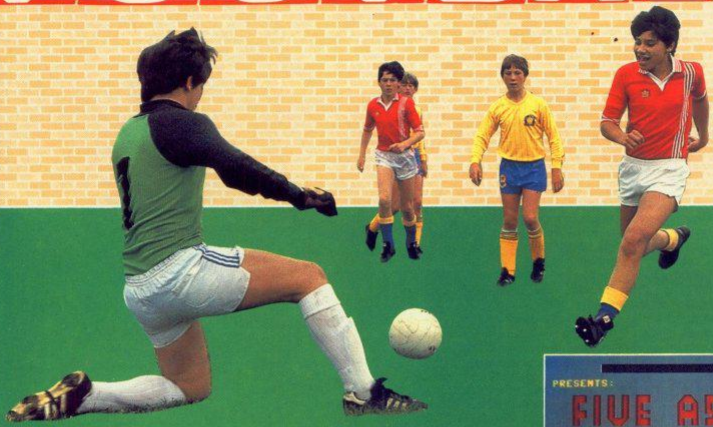
. . . BEHIND THE SCREENS . . . BEHIND THE SCREENS . . .

KARATE was the "only arcade game I played that I thought would be ideal on a home computer" says programmer Gregg Barnett. He put the idea to Melbourne House chief Fred Milgrom this January and "Fred jumped at the idea". Together with two other programmers and musician Greg Holland, Gregg Barnett has been slaving away in the software house's Melbourne bunker ever since. First he designed graphics handling routines to control the tall 72-pixel high figures on screen. Each player is made up of nine sprites which allowing for all the different shapes generated by 18 different moves makes a memory-sapping sprite count of 740. Fist was developed on BBCs with fast disc access linked to Commodore 64s. On the Commodore says Gregg "it can take up to three hours assembly time if you make a mistake compared with five minutes on the BBC." "Making the computer play an intelligent game" was the most difficult part of Gregg's job so he had to look for volunteers to take it on. "But this time there were too many takers. That's when we knew it was going to work." With sound and backgrounds as well cramming everything into the 64's memory was difficult. Holland's music alone took up 3K and the interrupt-driven sound effects — grunts, shouts, moans and a primal scream based on digitised real sounds, extracted at who knows what price from the Melbourne House staff — another 3K. Gregg worked on Commodore versions of Horace, The Hobbit and Sherlock Holmes so he knows how development teams can become bored with a program. "Normally when the game's out everyone's sick of it" but this time they carried on playing Fist.

Fist writer Gregg Barnett.

Meirion Jones

FIVE A SIDE FOOTBALL



Penalty shoot out feature

Fast moving characters leave competition standing.

Ideal family entertainment.

Voice Master generated speech.

Exciting simulation for **one** or **two** players.

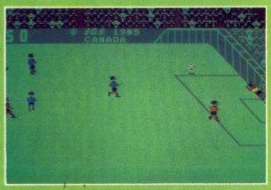
Amazingly realistic animation.

Speed and skill the essence of the game.

Ingenious method of settling arguments.

Demanding challenge at all three skill levels.

Enormous fun from start to finish.



CBM 64
64 Cassette £5.95
64 Disk £8.95

ANIROG

TRADE ENQUIRIES: ANIROG SOFTWARE LTD. UNIT 10 VICTORIA INDUSTRIAL PARK VICTORIA ROAD DARTFORD KENT (0322) 92513/8

Star chart

Dork's Dilemma

C-16
Gremlin Graphics
Maze game
£6.95
★ ★ ★

Slightly unusual in that the aliens try to trap you rather than kill you, though if you bump into them at any speed you've had your chips.

The graphics are all you would expect of the C-16 and the game is tactically interesting as you plant a time bomb and must be able to escape. Once you've killed all the aliens a piece of your craft is transferred out of the force field in the screen centre.

Saimazoom

QL and Spectrum
Silversoft
Maze game
£7.95
★ ★ ★

Ultimate Play The Game have really spoilt software reviewers. I might have raved about this game once. As it is, it goes down as competent and enjoyable.

You steer your figure, Indiana Smith, around the jungle collecting items which permit you to ford rivers, shoot hostiles and carve through rockpiles and you must collect water bottles.

Pipeline

Spectrum
Viper
Archetypal
£7.95
★ ★ ★ ★

The ideal game for paranoid DIY plumbers in an excellent implementation by Simon Ffinch — with acknowledgements to Taskset.

The pipes in this game have a good solid Victorian quality about them, and the plumber and his mate have a tough time fighting off the saboteur and the aggressive ladybirds.

Eight screens and you can choose your own keys, or use a variety of joysticks. And with another game — SOS — on the flipside, it's really good value for money.

SOFTWARE Shortlist

(continued from page 25)

Kennedy Approach

- *CBM-64*
- *US Gold*
- *Simulator*
- *£14.95*

★ ★ ★ ★

"AMERICAN ZERO zero five, turn left to bearing two seven zero, descend to two thousand feet", a crackle of static, and then "Roger" as the pilot acknowledges the order. No, this isn't the script from another turgid airport drama, but instead the new air traffic control simulator from Microprose. This game is not headed for disaster.

The speech, which is clear and understandable even down to the mid-western accent and the crackle of the radio, is all from the Commodore's own hardware. Just try that on a Sinclair!

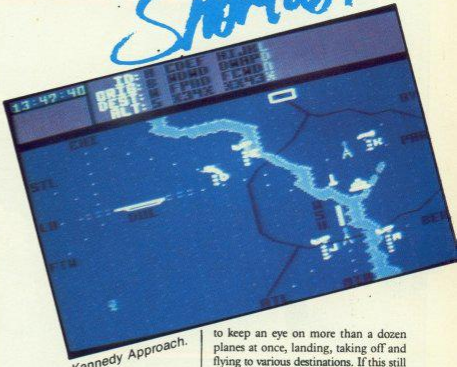
Putting the voice synthesis to one side for the moment, how does the game play? Previous efforts at this sort of thing have suffered from a lack of playability. But, here, all the information is easy to get at and entering instructions to the pilot is simplicity itself. You move a cursor over the plane to be controlled, press the fire button and then give orders on direction and height. If you forget the orders you gave a plane, ask the pilot.

The graphics are rather primitive, showing blobs on sticks moving around a grid. But it gets the information across, which is the main thing. Five locations are available, from sleepy Atlanta to hectic Kennedy. There are three different aircraft types, Cessnas, jets and Concordes, which all go at different speeds, important when working out where various planes are going to be in a few minutes time.

During a really busy shift, you have to keep an eye on more than a dozen planes at once, landing, taking off and flying to various destinations. If this still sounds too easy, then the computer will throw a few storms and emergencies your way as well.

After your fifth mid-air collision over New York in the rush hour, you'll be glad you weren't flying in to America shortly after Reagan did the big shift change with his Air Traffic Controllers.

Lee Paddon.



Kennedy Approach.

Jump Jet

- *CBM-64*
- *Anirog*
- *Flight Emulator*
- *£9.95*

★ ★ ★

YOUR CHANCE to slip the surly bonds of earth with a V/STOL Sea Harrier — you don't need a ramp to get off because this program's plane has been specially modified to carry only 5,000 lbs of fuel and four missiles. Little details like this add credence to the program, if being written by ex-jump-jet pilot Vaughan Dow didn't already give it enough. (Some killjoys usually take this opportunity to point out that some really bad flight simulators have been written by pilots.)

With speech synthesis and introductory music this program has enough of the polish needed for it to be able to hold its head up in today's software market. But I don't think flight simulator aficionadoes and purists will rave about it — it's more of an advanced shoot'em-up than a pure simulator. Nevertheless, the instruments are visible throughout the program action, faithfully reproducing what's going on.

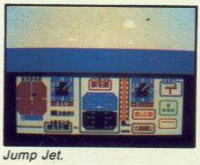
On the first screen, the top half shows an overhead view of the aircraft carrier with the instrument panel shown in the bottom half.

To take off you must hit the F key to select flaps down, switch on the vertical thrust — key 3 — and increase the power to maximum by pressing the + key. By selecting thrust at 45 degrees the aircraft can be boosted to normal flying speed. Don't forget to raise the undercarriage and flaps before exceeding 300 knots otherwise the computer will get panicky and shout at you. If the jump-jet is flown higher than 200 feet or out of range of the split screen display, the display shows the sea and the sky and the relative positions of the carrier and enemy aircraft are shown on the radar.

You achieve promotion by keeping the number of warnings down to the minimum permitted for your rank. So a Group Captain can only get away with three computer admonishments, whereas a Flight Lieutenant is allowed nine. A reverse example of what is meant by rank having its privileges. When the enemy aircraft attack you select M to activate the aiming sight and arm the missiles.

The higher you fly, the more difficult it gets — as you progress through the ranks, variable and deteriorating weather conditions make life more difficult.

Paul Bond.



Jump Jet.

Graham Gooch's Test Cricket.

Graham Gooch's Test Cricket

- *CBM-64*
- *Audiogenic*
- *Simulation*
- *£9.95*

★ ★

REMEMBER the Great Egg Race, all that hype and in the end all you did was sit back and look at it? Well, here we go again. Once the game has loaded, apart from changing the bowlers every now and then, you are free to get on with those other important tasks in life like making coffee and putting the cat out.

The screen gives a Ritchie Benaud eye view of the crease, as the bowler moves up to the wicket and bowls. The ball moves as realistically as the chunky graphics will allow, and the batsman takes a swipe at it. If he connects, you switch to another graphics screen of a

(continued on page 29)

JUMP JET

JUMP JET AVAILABLE FOR

	DISK	CASSETTE
BBC MODEL B/ELECTRON	£11.95	£9.95
AMSTRAD	£13.95	£9.95
CBM 64	£11.95	£9.95
VIC 20 16K		£7.95
C16		£7.95

Written by
Vaughan Dow
Jump Jet Pilot

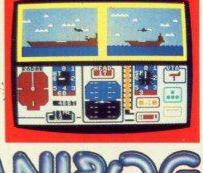
Every pilot has the dream of flying one of these unique and complex fighting machines. Here is your chance to do what few pilots have the privilege to try.

Depending on your skill, confidence and courage, you have the choice of remaining near the landing pad, learning to hover and land, or venturing higher to practise your approaches.

When you think you have mastered these, then accelerate the Jump Jet into an attack fighter. Use the radar and range finder to seek and destroy the enemy, by launching heat-seeking air-to-air missiles. Beware! His radar and missile systems are as good as yours. Reckless pursuit is ill-advised: you must maintain a fuel level that will enable you to relocate and return to the aircraft carrier, executing the skills you have learned to achieve a successful landing.

You are now ready to proceed to the next skill level to face additional hazards, such as unpredictable swell and treacherous cross-winds.

Be warned, this program is not a toy or game. You will need to co-ordinate your hands, eyes and mind to successfully complete each mission. Do not hope to achieve in a short time that which took the author three years to learn as a Jump Jet pilot, and over a year to record on this computer program.



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Star chart

Ancient Quests

QL
Spectrum
Mirrorsoft
Maze game
£7.95

★ ★

Two games for the price of one is the growing trend for sensibly-priced good value software. I'm not wild about this example from the normally sound Mirrorsoft label, however.

The games run perilously close to passing off arcade games as educational software, in my opinion.

In King Tut you wander round a sub-Ultimate maze matching shapes with names and so on until you find the hidden treasure.

The other game, The Count, is set in a Dracula scenario and deals surprisingly enough with counting.

EVA

QL
Westway
Arcade adventure
£10.95

★ ★ ★

EVA, far from being the new au pair, stands for Extra-Vehicular Activity as any child of the space age will tell you. Game has overtones of Jet-Pac, and consists of 26 different screens.

You must construct a teleport device to change screen. Naturally you are under relentless attack from aliens.

Anyone bringing out software, let alone games software, for the QL should be applauded, but when all's said and done, there are games just as good on the Spectrum.

Buggy Blast

Spectrum
Firebird
Shoot'em-up
£5.95

★ ★ ★

Graphically pleasing little number from the BT software house, which has inexplicably missed being reviewed in *Your Computer*. Fly down corridors shooting at assorted robots, orbs and flying saucers.

(continued from page 27)

few fielders running about. If you feel like getting involved, there are two ways. In simulation mode, the bowler can attack off middle or leg and the batsman can decide to play more or less aggressively.

One or two players are catered for. Arcade mode is a solo effort, the bowler is controlled decathalon style, and you have to hit the batsman's fire button when you want him to play. Before loading the main game, you can define your own teams. You enter their names, bowling and batting averages, and bowler type.

For this sort of game to succeed, it must either appeal to the cricketing buff or be just another arcade game. It lacks the sort of detail the buff would want to see, and for the arcade addict, it's just too dull.

Lee Paddon.

Dun Darach

- *Spectrum*
- *Gargoyle Games*
- *Graphic Adventure*
- *£9.95*

★ ★ ★ ★ ★

JUST WHEN you think that it would be impossible to squeeze any more out of the Spectrum, along comes a game which makes you wonder where it will all end. Gargoyle Games produce graphic adventures. But that is only half the tale, because Gargoyle graphic adventures are one of the jewels in the crown of British software.

Unlike most computer adventures, which are Tolkienesque or Gothic, Dun Darach, like the earlier Tir Na Nog, is Celtic. From the unpronounceable names, to the unspeakable horrors, Dun Darach is poetically atmospheric. In our dreams we've all been to Dun Darach.

The graphics and action are exceptional. Especially wonderful is the movement of the characters. Like a number of other graphic adventures, this one uses the movie camera approach. That is you do not see out of the eyes of puppet in the computer world. Instead you view him through a camera. He can be made to walk, grab, drop, fight and offer objects to others through the keyboard — the same medium is used to control the direction which the camera is pointing in.

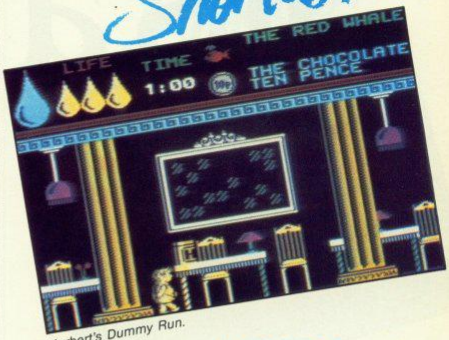
Cuchulainn is the name of the hero of the game. Tir Na Noggers will remember him, and his task is to free his pal, Loeg the charioteer, from the city of Dun Darach. He and the other inhabitants of the city look like rock musicians, with long flowing hair, bare arms and boots — the girls have longer hair and mini-skirts.

The city is realised wonderfully in this computer game, it is easy to get the impression that you are actually there. Taking the time to draw a map can be dangerous as the inhabitants are a bunch of thieves and pickpockets, but if you do you will be impressed by the size of it, and the attention to detail.

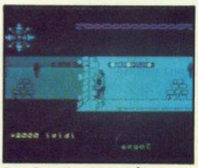
As graphic adventures go, Dun Darach is not easy. But it is highly original, superbly crafted and will give pleasure for hour after hour.

Bill Bennett.

SOFTWARE Shortlist



Herbert's Dummy Run.



Dun Darach.

Nodes of Yesod

- *Spectrum 48K*
- *Odin Computer Graphics*
- *Arcade adventure*
- *£9.95*

★ ★ ★ ★

THIS EVOCATIVELY named game features a home computer breakthrough — the first-ever Spectrum speech with Liverpudlian accent. But don't worry, it's only the introduction.

It bears certain similarities to Ultimate's Underwurlde, not least in the quality of production. You play a spaceman who must descend into the depths of the moon, collect eight alchiems — coloured shapes — and then get to the Monolith. All this to save the universe from some horrendous evil.

One of the game's nicest touches is that you're not alone in your quest. Before you disappear down a lunar pothole you need to catch a mole from its hole. When needed, the little crittur can be activated to chew through walls to new caverns, or to destroy the many creepy crawlies in the moon's depths.

The subterranean playing area has many platforms which you hop around on. Progress is made in a series of athletic somersaults which will often land you at the very bottom of a cave — minus a life.

Peter Connor.

Herbert's Dummy Run

- *Spectrum*
- *Mikro-Gen*
- *Arcade Adventure*
- *£9.95*

★ ★ ★ ★

MIKRO-GEN'S ARCADE adventures are witty in an Ealing comedy way, as opposed to the Raiders of the Lost Ark fun of Ultimate's games. Both software ranges use impressive graphics, undisclosed maps, and take time to master. Both software ranges are more expensive than the average Spectrum fodder, but as Rolls Royce will tell you nobody begrudges paying extra for quality providing they have the money.

Herbert's Dummy Run is a compendium computer game. A number of the rooms within the arcade adventure are mini arcade games in their own right. So for your money you get a lot of different games — a kind of Star Wars On 45. You have to find items that let you do things, like the tennis racquet which is used to hit the bouncing tennis ball. In this respect the game is adventuresque, but go-north, eat-food, bang-headers will turn their noses up at Herbert's babyish actions.

In fact, Herbert is a baby. Just to prove it, the game loads and starts playing "Baby Face" — if you can amplify your Spectrum's sound output it is worth doing so. He comes from a good family, being the child of Wilma and Wally Week, who you may remember from the previous Mikro-Gen games. Wally looks like a Tetley Tea man, but reminds me of Norman Wisdom.

The game is set in a department store; somehow Herbert has been separated from his mum and dad. His adventures on the way to the lost and found department are like a surrealist's nightmare, maybe he just drank too much gripe water.

Bill Bennett.

It's a snip.

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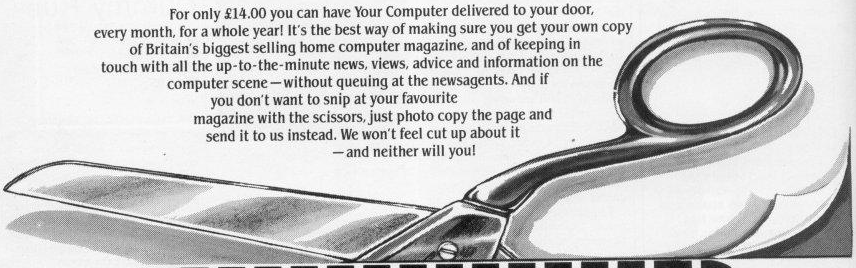

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YOUR COMPUTER

Star chart

Five-a-side Football

CBM-64
Anirog
Soccer game
£5.95 — disc £8.95

★ ★ ★

If this indoor football game has much of the excitment of ice hockey — and many of the same rules — you shouldn't be surprised. It was co-produced by Advantage, the same Canadian software house that brought Anirog's Slap Shot ice hockey game to the small screen. Not only do the players glide around the pitch as if they were on skates, they can also body-check each other with impunity on or off the ball. This escalation of soccer violence to the computer's screen adds a new and unexpectedly enjoyable dimension to the game. Your view of the action moves smoothly from end to end following the play, and the crowd gives a squelchy under-water roar as the ball hits the back of the net. The play switches to a penalty sequence whenever you cannon one player too many into a wall. Playing options include three levels against the computer, a penalty game plus the normal two-player.

Timeslip

C-16
English Software
Triple Scramble
£6.95

★ ★ ★

The game gives you three Scramble-type games for the price of one featuring a screen split horizontally three ways. At the top of the screen you fly a rocket over the landscape, in the centre you control a little man with a jet pack and on the bottom screen it's a submarine.

What are you trying to destroy, apart from the usual clutter of tanks, fuel dumps and civilian housing that tend to clutter up these sort of games? Well, there are 36 time orbs placed within the three time zones. Your job is to destroy all the orbs and synchronise time in the three zones to zero hours.

SOFTWARE Shortlist

Sky Fox

- *CBM-64*
- *Ariolasoft*
- *Shoot'em-up*
- *£9.95 — disc £12.95*

★ ★ ★ ★

NOT SO MUCH a flight simulator as a combat simulator, Skyfox features both air and ground attack, plus a variety of scenarios. The three-dimensional graphics are very impressive, especially in the airborne scenario. But the hordes of tanks rolling across the green terrain of the charted colony are just as deadly.

You have to defend your home base and installations against attacks launched from a vast alien mothership. You can develop your skills through various training levels through to small invasions, full invasions, or would a massive onslaught be more to your taste, sir? Likewise you get promoted through five ranks from cadet to ace of the base. It is possible to start high (against planes) or low (against tanks), in a combined scenario.

The screen display shows the view from Skyfox's cockpit. There is a central radar display as well as the actual view from the cockpit and by pressing f1 you can choose an overhead or a forward view. If there is no activity in your area, you can just hit A and the autopilot will take you where the action is. As Ariolasoft's Clive Brown put it: "You don't want to be hunting all of the time — there are plenty of other programs that do that".

But, you can hunt if you want to. Alternatively you can call up your on-board computer which gives an overhead display of alien incursions and by moving your cursor on the map and pressing A you can go to the most strategicaly important area, rather than just the nearest.

The prices certainly make Ariolasoft competitive with other quality US imports and this is a new game released within two months of its American debut. "My hope is that we will get prices down to the same level as cassette prices", says managing director Frank Brunger.

Other nice features in the game include afterburners — hit the space bar to blast yourself out of a sticky situation or to zoom in on the enemy. You can select a limited number of guided or heat-seeking missiles which wipe out your target as long as you keep it in the middle sector of your cockpit window. You can land at home base to refuel, which you'll need to do if you use the afterburners much.

There is also a set of five multiple mothership invasion scenarios, Halo, Alamo, Advancing Wall, Chess and Cornered which necessitate different kinds of threat analysis on your part.
Paul Bond.

International Tennis.

Sky Fox.

International Tennis

- *CBM-64*
- *Commodore*
- *Tennis simulation.*
- *£5.95*

★ ★ ★

Soggy strawberries, and tennis tantrums; such are the dubious pleasures of another washed out English summer, and one of its great institutions, Wimbledon. Thanks to Commodore, the sight of the rain tipping down on the centre court need no longer be a signal for tennis fans to despair, just plug-in your trusty Commodore, and get stuck in to this latest offering in Commodore's "International" series.

You get an umpire's eye view of the court, with a token bunch of blobs in the background "representing" the crowd. One or two player options are available, and four levels of computer opponent are provided. Control is via joysticks, moving the player around the court and playing the stroke.

The way you move the joystick as you hit the ball determines the sort of shot played in a fairly logical manner, i.e., pushing the joystick in the direction of your opponent plays a long straight ball, pulling the joystick toward you will produce a moderate length cross court ball.

Most shots are there — ground strokes, vollies, baseline play — but smashes and lobs are out.

Playing the game takes some getting used to. The side-on view is harder to judge than the more usual down-the-court style.

Looking at other offerings, there seems little to recommend this game over Activision's On Court Tennis.
Lee Paddon.

The Fourth Protocol

- *Spectrum*
- *Hutchinson Computer Publishing*
- *Adventure*
- *£12.95*

★ ★ ★ ★

SO YOU made it at last, Johnny. Congratulations, Bertie. This is the first phone call you take when as John Preston you take up your post as the new head of section CI(A), part of MI5 responsible for the security of government buildings. But you'd better not rest on your laurels too long.

A burglar steals some diamonds from a flat somewhere in England, but posts back to the MOD some NATO documents that he lifts by accident at the same time. Where's the leak? You'd better find out fast, or you'll end up being posted to the Falklands. Worse, a nuclear bomb may go off somewhere in the UK.

The game is divided into three sections: The Nato Documents, the Bomb and the SAS assault. You must solve the first part to get the password for the second part and so on. The game is a high resolution, predominantly monochrome icon-driven adventure. On the first screen you have representations of three VDUs, a filing cabinet, a VCR camera, a cassette (this is for utilities related to saving the game for continuation at a further date), a graph, and a date pad which can be used to advance time in the game.

You just move a pointing hand around the screen to select what you want to do. If you go through the VDU displaying memos a subset of icons is overlayed on the screen enabling you to read, file or bin documents. A dustbin icon is used for the latter function, as on the Macintosh computer.
Paul Bond.

The firing squad, from left to right, Formula 1, Arcade Turbo, PCA, Bat Handle, Champion, The Boss, 3-Way, Formula 2, Computek, The Stick, Computek and Super Champ.

JOYSTICK JURY

OF THE MAKING of many joysticks there is no end. A few years ago you took what you could get; now you're faced with a bewildering number of conflicting designs. Somehow you have to solve a complex equation involving such variables as strength, comfort, responsiveness, manufacturers' claims and, finally, the price. One of the factors affecting the last variable — price — seems to be the use of leaf switches or micro switches, the latter being more expensive as well as more responsive. Kempston's latest joysticks exemplify this difference.

In keeping with their new image as sponsors of motor sport, Kempston's sticks are now called the Formula 1 and 2. They've changed the previous black for a vibrant light blue. I think it's a disgusting colour, but de gustibus . . .

The **Formula 2** is the cheaper stick. It has two fire-buttons on the base — presumably to avoid accusations of right-handedism — and one on top of the shaft, which is quite tall and comfortably grasped. The trouble with this stick is that you have to move the shaft a long way to get the response you want. It could cost lives.

More expensive is the **Formula 1**, doubtless because it's micro switched. This makes it much more sensitive. The construction also seems to be more solid. But I found it rather uncomfortable to use. It has a very short shaft with a bulbous end. The two fire-buttons are both on the base. If you don't want to put the stick on a surface, it means wrapping your hand around the base and firing with the same hand. This caused me considerable pain in the region of the thumb.

Another company with a selection of sticks is Wico. **The Boss** is a pretty nifty stick, with a solid plastic base into which the shaft fits snugly. The single fire-button is at the top of the shaft, a location which can lead to a certain amount of fatigue. The Boss is, otherwise, very comfortable and also very responsive. Perhaps just a little too much so; at times there doesn't seem to be enough resistance and you go much further than you wanted to.

Wico's **Command Control** is a very superior joystick; solid, smooth and attractive. There's a snazzy red and black base with a steel shaft. The grip is smooth, but this didn't cause any problems. This is a very responsive joystick and should last a long time. But it's also pretty expensive.

Not quite as costly, though, is Wico's **3 Way Command Control**, which is the previous stick with knobs on. As well as the smooth grip, you get a moulded one and a large knob. Very useful if you treat your games like a round of golf. The extra grip means, naturally, extra price.

Much cheaper is the **Gunshot 1**, from Vulcan. Smartly turned out in grey and cream, the Gunshot has a big chunky handle that gives you a firm hold on things. Fire buttons are on the base and top of the shaft. It gives a quick enough response and, while not being the sturdiest stick

Goodness gracious, great balls of fire, from left to right, Micropride's Atari trackerball, Marconi's, the AMX mouse, Micropride's BBC trackerball, and Voltmace's data input pad.

around, seems pretty durable. At the lower end of the price range it's a good buy.

The Champion is another lower-priced stick but it has an auto-fire option as well as buttons on shaft and base. The black plastic grip is comfortable and you get a reasonable response from it. The whole thing is very light — perhaps too light for those who like to bash their sticks around. More restrained players should have no problems.

The **Arcade Turbo** disturbed me by the noisy clicking as I moved the handle. But it didn't seem to affect performance, which was tolerably responsive. The Turbo has buttons on base and shaft and is very solid; it should stand up to quite a lot of punishment.

But not quite as much as the **Super Champ**, which is a fearsomely large construction of heavy black plastic. The long and thick handle with fire buttons on top and in trigger position is secured in the massive circular base by means of a plastic collar that gives strength and the right amount of resistance without sacrificing sensitivity.

The Super Champ's cable rewinds into the base, and provides the occasion for some of the strangest instructions I've seen in a long time: "Rewinding the cable should be always clockwise. If sometimes reverse the direction which may cause extangled to the cable". So now you know.

The **Nidd Valley** brings a welcome change of atmosphere from all these brutal, boasting, macho names. It's like those old Dragon or BBC joysticks, built to be held in one hand and controlled by the other. Unfortunately, the stick you twiddle is rather too small — you can't really get more than two fingers round it. I suspect most people aren't satisfied with a joystick unless they can grab it in a fist and wrench it around.

If you can manage without chunky handles, then the Nidd Valley will do you very nicely. It's micro switched, and so pretty accurate and sensitive. It's also one of the cheaper sticks on the market.

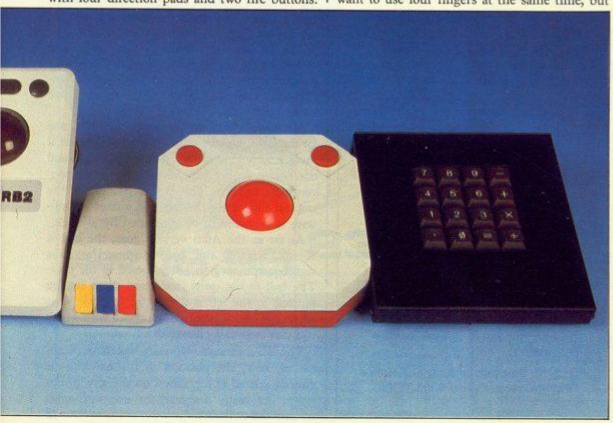
The **Joy Card**, from Hudson Soft, is a funny little thing and is definitely not for the histrionic games player. It's a small, slim rectangular "card" with four direction pads and two fire buttons. After using a joystick for a long time the Joy Card presents problems of adjustment. You most certainly cannot bash it about.

However, once you've got the hang of it it turns out to be sensitive and comfortable. It won't do for all games, and you won't like it if you don't want to use four fingers at the same time, but it's worth having a look at.

SURVEY

Shake rattle and roll, Pete Connor, our man with his finger on the button, gets to grips with the latest hits and misses.

Shooting from the hip with, from left to right, Gun Shot, Quick Stick, Delta 3b, Delta 14b, Delta 3d, Delta 3s, Delta 3b (BBC)



The Stick is almost as strange. It looks pretty much like a joystick except . . . Great Scott! What's this? . . . The base is missing!

It doesn't need one. It works by means of "eight-point mercury switches". You get the movement you want by tilting the stick in the required direction. Obviously, this takes some practice since there's no resistance to movement. The Stick, though, proves to be very sensitive and less tiring to use than conventional joysticks.

Of course, it won't do for every game. The distributors say "it is particularly good with race games and flight simulators", and I would endorse that; it performed well on Pole Position but didn't do much for my chance in the Karate game Way of the Exploding Fist. At £12.99 it can't be considered expensive, so it may be worth investigating.

BBC owners used to have a rough time when it came to finding a joystick other than the official Acorn ones which were widely acknowledged to be unsatisfactory, to say the least.

But times have changed. If they want a stick that looks much like everybody else's the **PCA** is just the ticket. It plugs into the analogue port

(continued on next page)

(continued from previous page)

at the back of the Beeb and is made of that old black plastic again, with the red buttons we all know and love. The shaft has depressions to fit your fingers ever so snugly, and is set to one side of the base. Fire-buttons are on top of the stick and on the base.

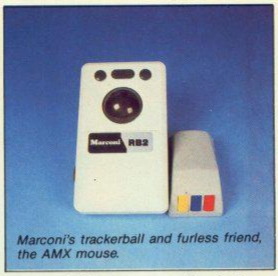
Control is pretty good with the PCA. My only reservation is that the thing is so light I wonder how much of a bashing it can take.

Voltmace's Delta for the BBC is another analogue joystick. It looks like a TV remote controller, with the small stick set in it at the top. Below that are three buttons; so you must have two hands to use it.

It's a self-centring stick with control that matches others. But the same reservations apply to this as to the Nidd Valley. There's not a lot to grip, and if you get over-excited I wouldn't like to be responsible for the Delta's safety.

Looking a little farther afield, Micropride import a range of joysticks from Taiwan. At the lowest end of the range comes the **Quickstick,** which bears more than a passing resemblance to the Amstrad joystick, without the extra socket. It is small, and rather frail looking, but the grip fits snugly in the hand, and there are three fire buttons, on the top and front of the grip, and on the base. The action seems rather loose, but positive, and seems good value for money.

The **Computek** Atari-style stick gets the award for sheer bulk. In traditional black and red, it dwarfs a standard joystick, standing nearly 20cm. high. Made for the avid decathalete, or



Marconi's trackerball and furless friend, the AMX mouse.

someone who likes to put everything they've got into a game, this one looks as though it would last for ever, certainly long after your Spectrum is an exhibit in the Science Museum.

The Computek stick for BBC computers is of similarly good construction. It is self-centring, with two fire buttons on its large base, and a metal shaft with a bulbous knob on top. It is quite sensitive, and has just the right amount of spring to centre the joystick without making accurate positioning difficult.

I think it was Snaglepuss who used to say "I hate those meeces to pieces", but he'd probably change his mind if he had a BBC and got hold of the **AMX Mouse.**

The AMX Mouse is so impressive because it comes with an excellent drawing program, **ART.** As with the Macintosh MacPaint program, on which it is modelled, this allows you to pull down icons with your mouse instead of having to type in text or otherwise enter commands.

Available options are arranged around three sides of the screen. Move your mouse over the desk until the pointer is on the required option, press one of the buttons and, hey presto!, you're ready to go. For instance, you might want to start with a little graffiti. So you just select the Spray Can icon and off you go. Instant subway art.

It doesn't take long before you're able to do quite sophisticated drawings. Mistakes don't matter because all you do is pull down the eraser and rub them out. Although the program is monochrome there is a choice of 32 different patterns so a wide variety of effects can be obtained.

Other software available for use with the AMX Mouse includes a Utilities disc with icon designer and Desk, a program containing diary, memo pad, etc.

The first thing you have to do with **Connexions' Magic Mouse** for the Commodore 64 is assemble it — ball and carriage are separately packed for safety. The software includes a Hi-Res Graphic Designer — in other words, a drawing program. It's similar to the AMX one, with the major difference that the menu of icons is not constantly displayed.

You have a choice of nine brushes giving a good variety of width and stroke. As with the AMX you can draw circles and boxes, fill in backgrounds and dump to a printer. This mouse, though, seemed a little inaccurate; it circles came out rather less perfectly than one might have expected.

Also included in the Connexions package are a Sprite Designer, an Icon Designer and a Mouse Controller which enables you to write your own software for the wee creature.

It's been said that a mouse is really just an inverted tracker ball. But it would be a foolish man who tried to use **Marconi's Tracker Ball** for the BBC upside down. It's a hefty piece of peripheral, with a large brown ball set in the solid base. Marconi supply some software with it, including a painting program. This is not as sophisticated as AMX Art, but it does show just how accurate and sensitive the tracker ball can be.

The Tracker Ball can also be used with some — but by no means all — joystick-compatible programs. But how many games, Missile Command apart, would you want to use a tracker ball with? Not many, I'll wager.

Micropride also import two trackerballs, one for the BBC, and the other Atari style. The usual problems apply, at £19.95, they are expensive and don't seem to offer great advantages over the conventional joystick. This is not the fault of the trackerball, merely the fact that almost all software is designed to be controlled by joystick.

As far as the Atari version goes, the box is 15cms. square, and even during the most vigorous spinning will stay rooted to the spot. The ball moves quite freely and there are fire buttons to the left and right of the ball. One advantage over joysticks is the speed with which you can stop and change direction.

The BBC version obviously has more potential as, here, the position of the ball can be directly related to a position on the screen, but again, not really designed for use with most commercial software. ■

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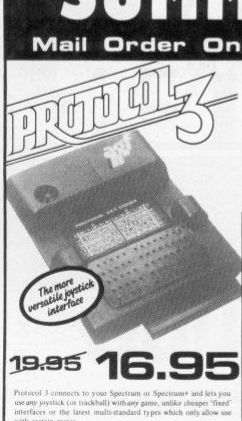

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ENTERPRISE *competition* RESULTS

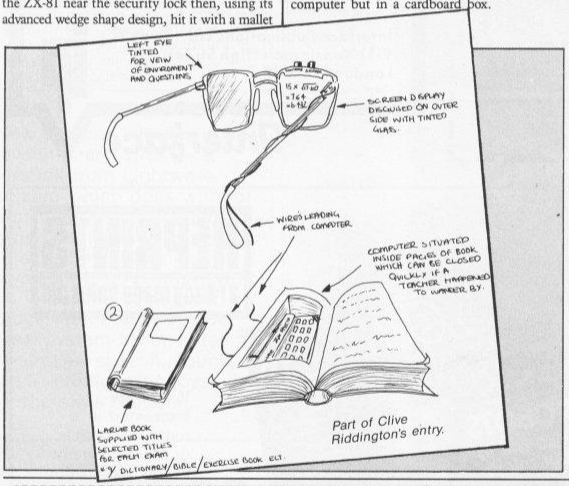
IN MAY'S COMPETITION to win an Enterprise 128 plus a printer you were asked to come up with an idea either for cheating in an exam, or for pulling off a computer scam. To our surprise this sparked off a minor scandal.

Teachers and headmasters accused us of trying to subvert the exam system: copies of *Your Computer* were withdrawn from school libraries, school kids protested, and questions were asked in the House. In our defence we protest that the competition was intended as a light-hearted jape; and to our detractors we reply: Come off it Chalky! Where's your sense of humour?

Needless to say most of the entries took the competition less seriously. C. Holland suggested a way of using the ZX-81 to hack open the computer-controlled security door of a bank: place the ZX-81 near the security lock then, using its advanced wedge shape design, hit it with a mallet so forcing the door open.

J. Andeh's idea was to program a computer to control a robot arms on wheels. During the exam the robot is to approach the supervisor and yank down his trousers. In the ensuing confusion you can take out a pre-prepared crib sheet and start cheating. This entry was nicely illustrated by a cartoon in the style of the Beano's Bash Street kids.

H. Kay revealed his three-part plan for making sure that he won the competition. First, break into the computer-held record of competition entries and delete all other entries. Second, hold *Your Computer's* memory banks to ransom. Third, alter BPI's records "to show that I am editor of *Your Computer,* whose decision is final". Just as well that the entries are not stored on a computer but in a cardboard box.



Part of Clive Riddington's entry.

As you might expect many people hit on the idea of using hidden radio transmitters to communicate with computers during an exam. Seiko wrist micros were also popular, as was the technique of projecting answers on to spectacle lenses.

The best entries along these would-be practical lines were from R. Buckley with his comprehensive Cheat-O-Matic system, and C. Riddington with The Perfect Exam Cheat Implement.

All those mentioned above receive the runners-up prize — copies of the Hackers Handbook and Computer Crimes and Capers.

We awarded the first prize to one of the most entertaining entries submitted in a long time, which came from Manolo Abd-El-Baki, 21 Rue Daniele Casanova, 91330 Yerres, France. This amounted to a definitive study of cheating, or cheatology as the author calls it.

Cheating philosophy

At the start Abd-El-Baki discusses the philosophy of cheating. He argues that "cheating is a basic need for virtually all students" and cites the Greek philosopher Aesopius, who said "cheating is the mother of all wisdom".

Following this he takes a look at the history of cheating and makes the bold claim that "the search for the perfect method of cheating has been man's greatest preoccupation since the dawn of civilisation".

Finally he gives the specifications of his new model, the SOGE — Standard Operational Cheating Equipment — accompanying them with diagrams and formulae. A team of *Your Computer* scientists is now carrying out a feasibility study on the system, and its full details cannot be disclosed here. Suffice it to say that SOGE involves a pair of glasses, a contact lens, and a strip of microfilm.

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- All entries must arrive at the *Your Computer* offices by the last working day in August 1985.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employees of Business Press International or their relatives may enter the competition.
- The decision of the editor is final.
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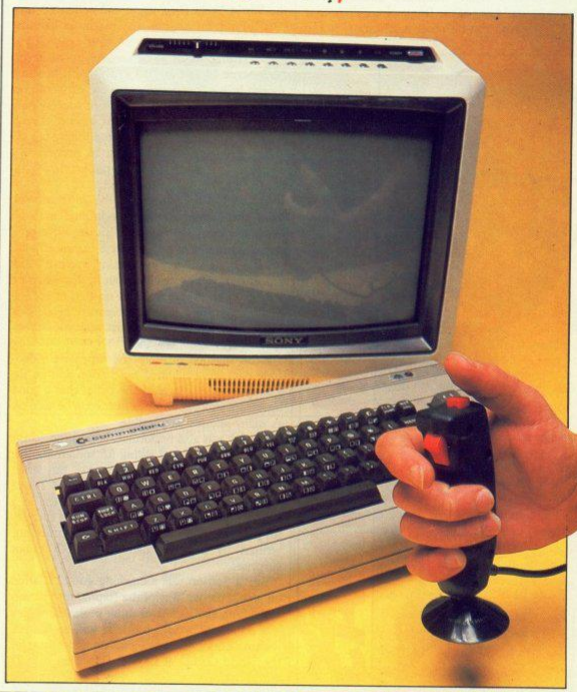

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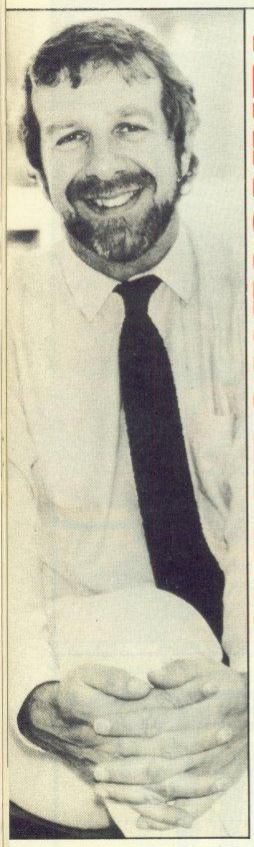
FIRST FIST, THE

FIRST FIST — THEN, Mordon's Quest, Terrormolinas, and Lord of the Rings plus conversions of Starion and Fist for other machines — not to mention future projects like a Whitbread Round the World Yacht Race game and enhanced versions of current hits for new machines like the Commodore 128.



TERRORMOLINAS

Knuckle wrestler Geoff Heath, Melbourne's new U.K. chief, still plans to go ahead with the launch of Terrormolinas — a holiday disaster spoof adventure by the team who wrote Hampstead — despite the trail of real life disasters facing tourists this summer, from hijackings and bombings in mid air and on Spanish beaches to alerts in British resorts.

Everything seems to be coming up roses for Melbourne House since Geoff Heath became British boss a few months back but he would be the first to admit that the seeds of success had already been sown. The current wave of strong software was all under development long before Geoff took control, but when he arrived the company had faded out of the public view with Starion waiting to be launched.

Although Fred Milgrom, the international head of Melbourne House, admitted to *Your Computer* that the likes of Ultimate were producing arcade games that "were technically far superior to what we were coming up with" and promised to do something about it, that was over a year ago and there was still no sign of action. Melbourne was a leading adventure house but had no chance of catching up with the arcade specialists.

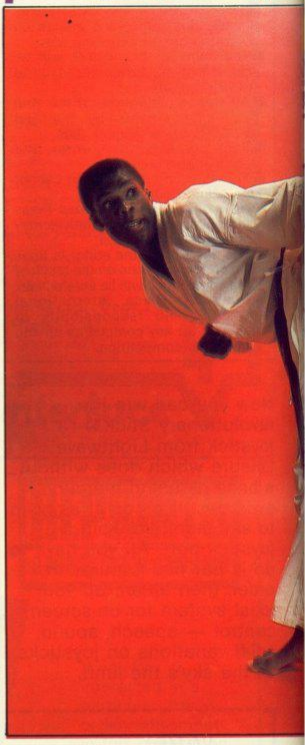
Geoff decided to scrap the expensive video-style packaging planned for Starion and go for a simple cassette case in the belief that a good Spectrum shoot'em-up just needed to be seen on as many shelves as possible.

Timing was also important — with thousands of Spectrum owners looking for something like Elite to come out on their machine. But when Starion hit the shelves the quality of David Webb's vector graphics on screen and the idea that Melbourne House could produce a successful program that was neither an adventure nor written by an Australian were both major surprises.

But if Starion was a cracking good variation on an old theme, Way of the Exploding Fist was something else — one of those programs which sets standards by which others will be judged. Timing again was nice — out in good time for the World Games at Crystal Palace on July 27 where non-Olympic sports like Karate will have their world championships.

Jeoff Thompson, World Heavyweight Karate Champion from 1982-84 and Team Champion now, who is competing there, believes that Fist has enough of the feel of the real thing to attract computer gamers into abandoning the screens and taking up Karate. Jeoff urges caution though "I want to see the sport develop — and safely. If they wish to take it up go to a local karate club but be careful". If anyone plays the game then wants advice on taking up the sport they can write to him for advice at Pursuit of Excellence, PO Box 699, Fulham, London SW6.

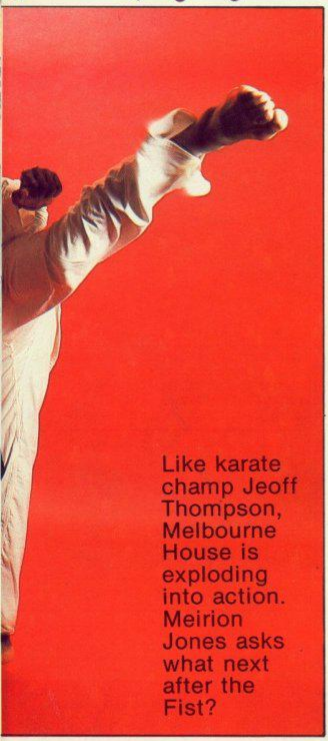
Jeoff first tried Fist at the Commodore show "it looked very authentic, movements, drop sweeps — the mood, music and atmosphere" but he couldn't take it seriously — until he had suffered the indignity of being repeatedly laid out by kids of half his age, "I got really competitive". With three hours a day training for the championships — "it's a combat form of chess, you never really master it" — Jeoff has not had much time to improve his game on screen but he uses it as a break from training. He'd like to see a sport version where you take on teams from other countries.



After Starion and Fist, which were the May and June blows in Melbourne's Summer offensive, July drops into lower gear with Mordon's Quest. Geoff Heath was born in Morden, and if my supposedly efficient Croydon-based hire-purchase company claims to operate from Croyden on its headed notepaper, I suppose these Aussies can get away with a mis-spelt tribute to the head of the British office.

But no, Mordon's Quest turns out to be just the next text only stage in the Classic Adventure. Mordon is apparently the most important person in the history of the universe so I suppose he need not worry about being mistaken for a grey south London suburb stranded between

N..



Like karate champ Jeoff Thompson, Melbourne House is exploding into action. Meirion Jones asks what next after the Fist?

Mitcham and Cheam.

About the only significant feature of the Quest is that it will be ready simultaneously in Spectrum, CBM-64 and Amstrad versions whereas Starion and Fist will gradually migrate to other machines over the next couple of months.

Summer migrants to Spain are the targets of Terrormolinas, an adventure aimed at people who do not usually buy adventures by the team who wrote the snobby social climbing computer game Hampstead — Peter Jones and Trevor Lever. Peter works in public relations and he says that Hampstead went down well although "*Your Computer* were fairly scathing about it. It was tongue in cheek which perhaps you didn't realise". At least that well known micro mag The Listener made it their computer game of the year.

This time Peter and Trevor are taking more of a chance. Terror is based on the idea of collecting snapshots — unlike its predecessor this game has graphics — during a Spanish holiday in which everything that could go wrong does go wrong — from tummy bugs to bombs. Despite the risk of accusations of bad taste if tourists are hurt on the Costa Brava this year, Peter says it's "less risky than actually going to Spain". He's also not worried that the Spanish government may be offended — "we haven't written it for the Spanish tourist industry. I hope it does offend some people".

No wonder Fred Milgrom asked them to "be nicer to the Spaniards" when he saw an early version. Fred's other contribution was the name Terrormolinas which he suggested as an alternative to the working title which was Holiday in the Sun — after the Sex Pistols song.

A global conspiracy game is what Trev and

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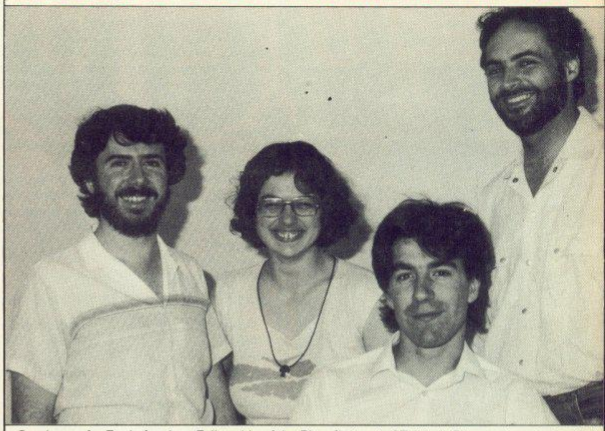
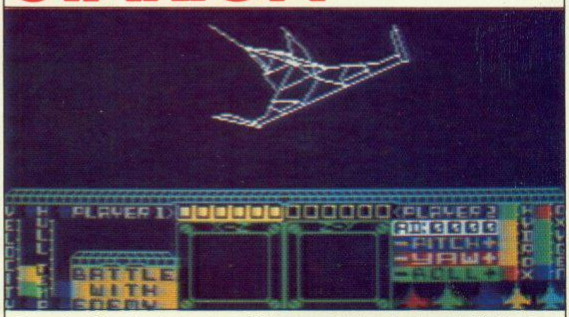
LORD OF THE RINGS



Good news for Frodo fanciers. Fellowship of the Ring, first part of Tolkien's Ring and eagerly awaited sequel to the program which established Melbourne's reputation — The Hobbit — will appear in late September. Philip Mitchell, left, who programmed The Hobbit and Sherlock Holmes is team leader for Lord of the Rings and is seen here back at base with Lyn and Russel Comte and Fred Milgrom, right, who is the international head of Melbourne House.

STARION



Commodore 64 and Amstrad versions of Starion are on the launch pad now that the Spectrum shoot'em-up is hurtling up the charts to prove that Melbourne House can produce arcade games as well as adventures.

MORDEN'S QUEST

Mordon's Quest takes up where Classic Adventure left off. It's a 150 location text adventure and Mordon is the ancient one who asks you to find all the components of his immortality machine — if you fail the universe will be destroyed.

(continued from previous page)

Pete are working on next — sounds a little closer to the "plain of Tharg and the misty mountains of Blimp" which are the traditional settings for adventures and which they find "almost incredibly narrow".

Lord of the Rings

Meanwhile back at the Victoria branch of the Melbourne House global conspiracy Philip Mitchell is leading the team working in the ultimate misty mountains adventure — The Lord of the Rings. After the Hobbit — which was also programmed by Philip — expectations are high so there will be no attempt to cram the whole thing into one game. He and his team, which includes "Fred's creche" — a bunch of University of Melbourne computing students moonlighting in the vacations — are putting together The Fellowship of the Ring, the first part of the Tolkien Ring trilogy which again like the Hobbit will be a book plus game set to be released in late September. Then the other parts — the Two Towers and the Return of the King will be released at six month intervals. Before the Two Towers appears the Whitbread Round the World Yacht Race, which will run from this September to next March, should have made it to Australia and back again. Appropriately Milgrom plans a simulator game based on the race where you have to use radar and satellite navigation as well as fighting off the hazards of the sea.

Now that Melbourne House has a British boss — below Fred but at least every decision does not have to make the passage to Australia and back — the company seems to find it easier to hold to its intended course over here.

Geoff Heath does not think that the problems of Acorn, Sinclair and the like are a real threat to the software industry. "Even if Sinclair is having problems right now I don't believe the consumer is worried by that. People have still got money to spend". Piracy is not such a problem either "if you produce a good product at a good price" and the "new copyright act will help".

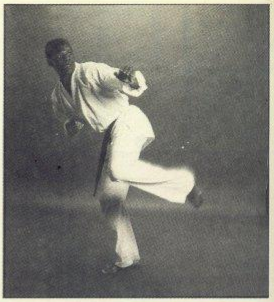
He believes that most of the small software houses that have folded were bound to go anyhow. "The days of starting up in a garage and running off a few hundred are over. The big software houses — under 10 companies count — are run as businesses. Soon there will be six or seven companies with others under their wings".

Looking forward to more Ram

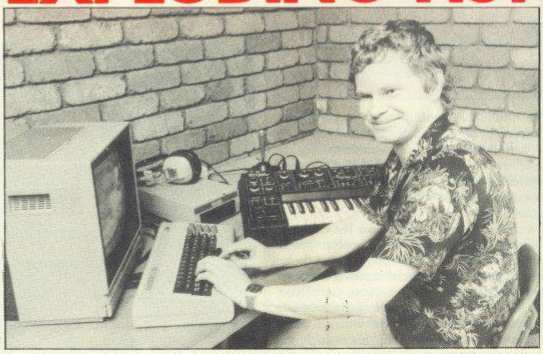
New machines mean it takes more programming time to create games that will take advantage of increased Ram — which again favours companies with big resources, but programs like Fist use every last byte of the 64's memory and Melbourne's teams are already looking forward to the luxury of 128K Ram and beyond. "More memory has never been enough for the programmers" as Geoff points out. At first they will produce enhanced versions of existing games for machines like the CBM-128.

Melbourne will still carry on producing books, for people who have just bought a micro "to tell them there are other buttons on it than shift and run" or who want to go on to machine code — "the helicopter head stuff".

Before joining the Milgrom organisation Geoff was Mr Activision in this country so he's seen it all but he is still enthusiastic about computer games. After all "there's no other business where you can go home at night and be a karate expert".



EXPLODING FIST



Gregg Barnett, who converted the Hobbit and Sherlock to the Commodore before making his mark with Way of the Exploding Fist, is now converting Fist to the Amstrad and Spectrum and — memory permitting — the BBC, in other words if the Plus ever takes off.

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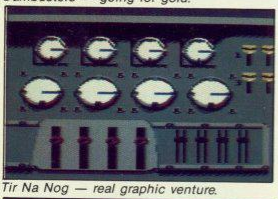
NAME YOUR T

Just name your top 10 games and win a Commodore 64, a CPM machine and 128K of Ram all rolled into one — in other words the Commodore 128. Sounds easy — but as Ellie Dee, Elsie's elder sister, finds out you can be spoilt for choice.

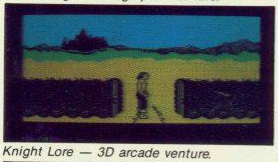
ALTHOUGH PURISTS tell you there's no difference between the early jerky monochrome space invader clones and today's games like Skyfox and Raid Over Moscow, or that adventures have not advanced since Crowther and Woods Classic Adventure, the qualitative jump between chasing white blobs around the screen and playing arcade quality games in your own home came with the launch of popular colour computers — the Vic-20 in Summer '81 and Spectrum in Spring '82.

Gridrunner — the Vic-20 classic.

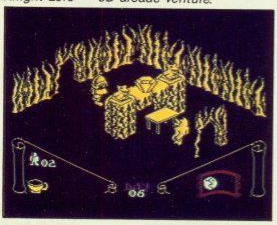
Dambusters — going for gold.



Tir Na Nog — real graphic venture.



Knight Lore — 3D arcade venture.



Games like Jeff Minter's Gridrunner made good droid-zapping use of the Vic with enough colour and buzz-saw sound to keep you mesmerized. It had that magic addictive ingredient which puts it in my all time top ten — unlike Minter's later efforts which were technically more proficient, colourful, tuneful and complex but less fun to play.

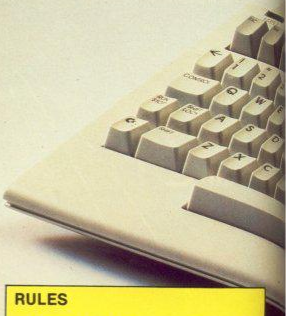
Meanwhile in America Atari waded in with a whole series of cartridge games that were to set the standard for the home arcade. Missile Command, Defender, Star Raiders and Pole Position all used the Atari 400 and 800's superior graphics and sound capabilities while the quirky Oric went another way, even if the price of machines and software kept them out of the hands of all but a few British Atari fanatics.

Pole Position was unchallenged as a racetrack game until the likes of Talladega on the Commodore 64 and Revs on the BBC. Star Raiders was only upstaged by the slower and more thoughtful Elite this year. Buck Rogers-type games passed me by although Zaxxon still has its champions. Frogger spawned hundreds of copies, elaborations and even simplifications like Jumpin' Jack which has a charm of its own; snake games slithered out of all the software houses and every self-respecting micro had to have its own version of Galaxians.

But nothing compared with the Pac-Man madness that swept two continents and slides into my 10 toppers. If Pac-Man had arrived a couple of years later it would probably have been called Ghostbusters. Pity it didn't play as good as it sounded on the 64.

In Britain in 1983 Manic Miner singlehandedly raised expectations of what the humble Spectrum might achieve and platform games became the rage. At the same time strategy struggles like Eastern Front, or on a less serious level Football Manager, developed. The Commodore 64 allowed more realistic sports games on screen — like International Soccer which set new standards for realism.

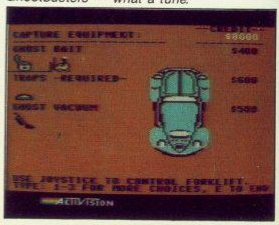
The bigger memory of machines like the 48K Spectrum 64 allowed adventure writers to go for epics like the Hobbit. Tir Na Nog might make my ten. Knight Lore definitely does — I love the 3D crossword style of arcade adventures with those Filmation graphics. You need little reminding of the outstanding programs of the last year, some of the strongest yet. From Fighter Pilot and Boulderdash to Daley Thompson's Decathlon and Solo Flight, David's Midnight Magic and Lords of Midnight or the current wave of block busters — Dambusters and co.



RULES

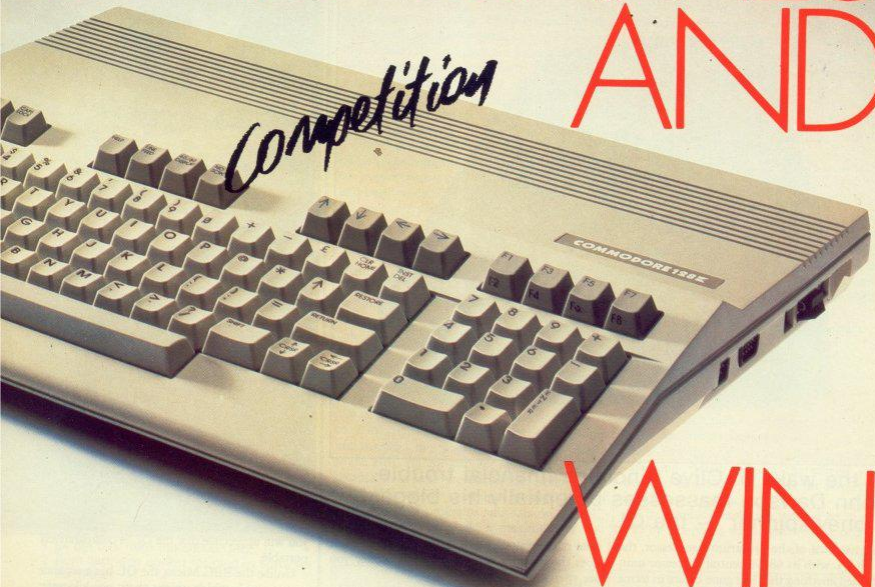
- The winner of the competition will be the person who, in the view of the editor, comes up with the most amusing or clever idea for a new screen, room or feature for their favourite game.
- The name of the winner will be printed in the November issue of *Your Computer.*
- All entries must arrive at the *Your Computer* offices by the last working day in August 1985.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employees of BPI or their relatives may enter the competition.
- The decision of the editor is final.
- No correspondence on the result of the competition will be entered into.
- BPI assumes no responsibility or liability for any complaints arising from this competition.

Ghostbusters — what a tune.



TOP 10 GAMES AND WIN A CBM-128

Competition



YOUR COMPUTER

CBM-128 COMPETITION

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Don't forget to enclose this coupon, or a photocopy of it, when you send in your idea, which can be written or drawn or both, for a new screen, room or feature in your favourite game plus a list of your Top 10 commercial games to *Your Computer*, Room L221, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

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Written or drawn idea for new addition to an existing game — use extra paper if necessary.

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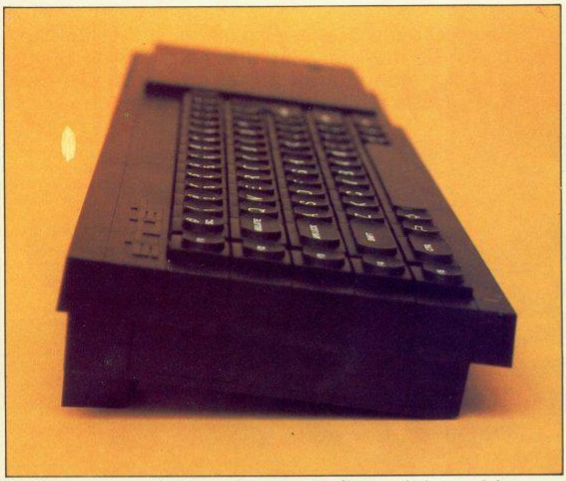
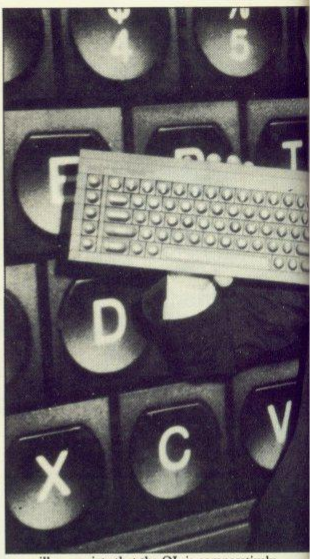
THE SINCLAIR QL





In the wake of Clive Sinclair's financial trouble John Dawson reassesses potentially his biggest money-spinner — the QL.

THE LAUNCH of the Spectrum's successor, the 16 bit QL with its 68008 central processor unit, exceeded anything that had gone before in terms of advance publicity. It was unfortunate that, once again, the manufacturer's marketing advisers took precedence over wiser judgment that the QL machine wasn't ready either in terms of the quality of the software or the factory's capacity to deliver.

The operating system software and Basic interpreter contained numerous errors and a series of new Roms have been issued in the course of the first year. That's a depressingly familiar story but it occurs across the board in microcomputerland; remember the early Eproms in the BBC Micro and the problems with the Oric. Writing original software is very difficult, particularly at the low level of an operating system. The new Apple software for the Lisa — a comparatively unsuccessful launch, but for different reasons — and the Macintosh, took more than 100 man-years to write at the cost of a king's ransom.

But, admire Sir Clive Sinclair's entrepreneurial spirit as you may, if you take delivery, several months after placing your order, of a machine which doesn't work properly, you are likely to discount your role in the British computer industry's success story and demand a better product.

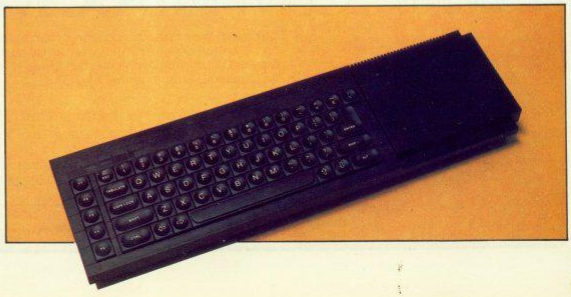
Now leave all these aside, for if you buy a Sinclair QL microcomputer today they are past history, how good is the QL as a general purpose microcomputer now, and what sort of value does the machine represent for the money you are spending?

Hardware is less important than software at the level of complexity represented by the Sinclair QL. Nevertheless, it is the hardware that provided the basis for the name "QL". A quantum is the smallest quantity of some physical property, such as energy, that a system can possess according to the Quantum Theory.

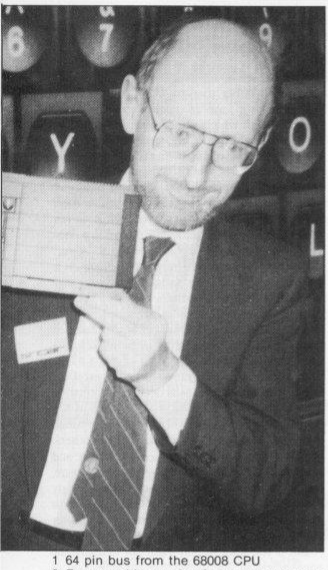
The QL is 48 cms — 19in. — long, 14 cms — 5in. — deep, 5.5 cms — 2in. — high and weighs 1.5 kilograms. In that space is the main printed circuit board, two Microdrive tape units and the keyboard. Compare these measurements with the BBC Micro's 16 by 14 by 2.5in. and you will appreciate that the QL is comparatively portable.

Unlike the BBC Micro, the QL has a separate power supply which weighs about one kilogram; but the BBC requires a separate tape recorder or floppy disc drive for mass storage of programs or data.

Communication with peripheral devices is an important part of the design of a successful microcomputer. Compatibility and standardisation are effected at several levels, from the design of the plugs and sockets at the lowest level, through to software protocols that will control the transmission and interpretation of information at the highest. There are 11 sockets on the QL:



– IS IT MATURING?



1 64 pin bus from the 68008 CPU
2 Rom cartridge socket for plug in software cartridges
3 Two control socket for joysticks
4 Two non-standard RS-232 sockets — leading to one RS-232 interface
5 UHF output providing modulated RF for a TV
6 Video outputs
— RGB + synchronisation
— Monochrome + composite synchronisation
— Composite PAL video
7 Power — Power supply unit delivers 5 volts at 1.8 amps and 15 volts AC at 0.2 amps
8 Two 3.5 mm sockets for linking up to 63 QL computers into a type of Local Area Network

There is no parallel port which would be compatible with a Centronics interface on a printer. The control sockets for games joysticks are inputs which are switched on or off rather than the accurate, if slow, analogue to digital converters on the BBC computer.

On the other hand, the inputs in each QL control socket have been arranged to correspond to two different, and very useful, sets of keys on the keyboard. If you wanted to write a program, for example, that would allow a disabled person to use a wordprocessor program, this arrangement would give you a good start. By most standards the QL is resonably well equipped in terms of the input/output hardware.

The QL keyboard consists of two plastic membranes which have opposed metallised pads underneath the hard plastic keys. When a key is depressed the two pads are squeezed together and an electrical contact is made. The keys travel a reasonable distance down and up when they are pressed but there is no definite point at which you can be sure that an entry has been accepted by the machine.

Visual display unit manufacturers like Televideo make computer terminals that will stand up to continuous use for many hours each day and they use orthodox keyboards which feel like an electric typewriter.

One of the best keyboards that I have come across was on the original Nascom. That used semiconductor Hall effect switches which operated when a tiny magnet was moved by the operator's finger pressing on the key. There were no mechanical contacts in the Nascom keyboard and no "bounce" or multiple character entry.

After the Nascom there was a steady tendency to downgrade the quality of the keyboard in new machines, presumably because the economics of competition have intruded more and more into domestic microcomputer design.

However, the QL keyboard feels much better than the Spectrum or the first Oric and the improvement is probably due to the influence of the BBC microcomputer keyboard which is acceptable to both secretaries and scientists.

Two Microdrive cartridges provide built-in mass storage of programs and data on the QL. Each cartridge will hold a maximum of 100 Kbytes and the continuous loop of tape completes one traverse in seven seconds. The BBC machine requires either an external tape recorder or floppy disc drives before it will store anything.

Data transfer using cassette tape is comparatively slow — 120 characters per second — but the BBC interface is robust, if primitive. Like other aspects of the computer, the QL design is theoretically attractive; the hard questions are to do with practical reliability and the Microdrive's cost effectiveness.

I think I would still hesitate to trust information that affected my livelihood to the QL Microdrives without the most careful backup procedures. Floppy disc manufacturers quote the expected error rates for storage and retrieval of information and the uncorrected false read/write data rates are better than one bit in 10 gigabits and the floppy and hard disc interfaces now on the market for the Sinclair QL will make the computer more attractive.

However, the additional cost will bring the QL close to the Apricot F1 purchase price and starts to whittle away at the BBC price differential.

The QL screen display on a monochrome monitor is very good. The image is stable and lower case letters such as q, y, g and j have descenders which are two rows deep — the BBC characters are one row deep — and are easy to read. The spacing between lines is good. The operating system adjusts the screen format between 80 and 64 characters for display on a monitor or a television.

The graphics resolution may be set to either 255 by 255 pixels with eight colours, or 512 by

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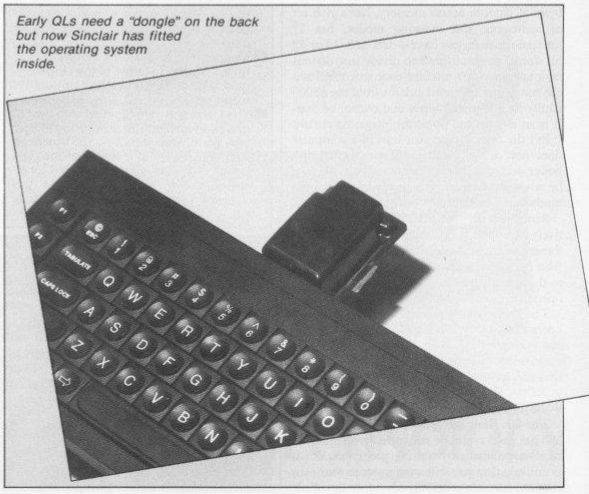
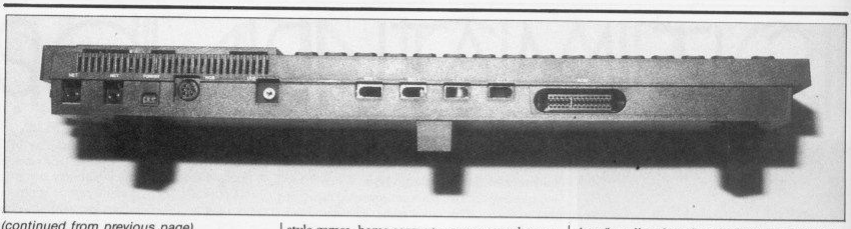


Early QLs need a "dongle" on the back but now Sinclair has fitted the operating system inside.



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255 pixels and four colours. However, it is possible to produce stippled or mixed colours which increase the complexity of the graphics effects considerably.

The QL is lighter than the BBC Micro and this can be attributed, in part, to the use of more recent, and more sophisticated integrated circuits. The memory chips in the QL are 4164 ICs — 64 Kilobits — set against the 4816 ICs — 16 Kilobits — in the BBC. Similarly, the QL uses two microprocessors and a number of ULAs — Uncommitted Logic Arrays.

The weight of the chips themselves is immaterial; it is the clustering of more functions into a single chip that matters. Reducing the "chip count", with consequent effects on the size of the printed circuit board, the number of associated components, and the smaller case, is the factor that contributes to the lighter, but more powerful, machine.

"More powerful" is a statement that needs careful examination. The Motorola 68000 central processor unit is an extremely powerful integrated circuit that is used now in some very expensive commercial computers. UNIX, the suite of programs that looks to have a good chance of becoming the next standard commercial operating system, runs happily on the 68000 series of microprocessors.

The CPU itself can address directly 16 megabytes of random access memory, has a rich set of addressing and indexing modes, has 17 internal registers, can handle data as 8, 16 or 32 bit words, has multiply and divide instructions built into the chip's machine-code repertoires and can use cheap integrated circuits from the 68000 family for peripheral input and output of data. It is an elegant and powerful integrated circuit.

But the central processor unit of a computer does not determine the effective computing power delivered by the machine. The CPU may be strangled by poor design of the rest of the machine or smothered by badly written software.

Remember that the BBC Micro uses the relatively old 6502 CPU and yet BBC Basic performs calculations faster than almost any other 8 bit microcomputer. The BBC's success is owed to the stunningly clever design of the machine operating system and the Basic interpreter.

The Basic interpreter in the QL does not operate as quickly as the BBC Micro despite the raw power locked up in the 68008 CPU. It is the software that you buy or write for a computer that unleashes the power. Without instructions to follow, the most powerful computer in the world is a useless, dead thing.

The QL Basic interpreter is well thought out and has good syntax or structure for helping you to solve problems by writing programs. But it is unlikely that you will want to write your own communications program, adventure or arcade style games, home accounts programs and so on. The range of software for the QL is still quite sparse and this, I think, is the most serious criticism of the computer taken as a whole.

Four programs are supplied with the QL. The first versions operated slowly but these have been replaced with a new issue 2.0. Sinclair has operated an exchange scheme for the earlier programs.

Quill is a powerful wordprocessor with very sophisticated on-screen formatting, good file handling and good control over the printer. Its search and replace facility is fairly basic but overall Quill is an effective and friendly piece of software. Two other programs — Abacus, a spreadsheet and Archive, a database — complete the three most used pieces of software in office work.

Abacus has all the usual facilities that are regarded as essential in a good spreadsheet program and, in addition, you can use labels to identify rows, columns or single cells. It is far easier to build a model when you can refer to "December.Materials" or "Temperature.5 Gallons/hour" rather than to "A24" or "V17".

Archive is a form of database programming language with which you can create procedures to enter, manipulate and print information according to your requirements. The manual says that it is possible to build relational files as well as the simpler card indexes. Archive is similar to dBase II in terms of the commands — there are 65 instructions — and although it is not possible to create a number of indexes to a database, Archive has a large potential.

Easel, the fourth program from Psion, is a clever business graphics package which will take data and present it in different ways. You can display pie charts, bar and line graphs on the screen and the program will dump the screen image to one of several printers included in the printer driver.

All the Psion programs have an excellent "Help" facility which loads detailed information from the program cartridge about any of the functions in the program. Data can be exported from any of the programs to any of the others. These two features, assistance on screen and integration of the data used by all the software, would make the Psion software outstandingly good value if you had to buy it. Given away with the machine, it is clearly the main reason why many people buy the QL.

But if you want to play games or demonstrate some scientific theory such as the reflection of sound waves from a concave surface, it's a different story. It is almost impossible to buy programs for the QL from W H Smiths and similar high street chain stores and even the pages of specialist magazines offer very little apart from a terrific chess program.

While the QL is well supplied with languages — APL, BCPL, Forth, Assembler, C, Lisp, Pascal, Fortran are all available from one company or another — it has not attracted the huge programming effort that went into its predecessor. ■

CONCLUSIONS

- It's the software that controls how useful or entertaining a microcomputer will be for you. I am never impressed by the fuss and bother that surrounds 16 bit micros. Software for eight bit machines is still only beginning to scratch the surface of the profitable and/or socially valuable uses to which microcomputers can be put.
- Most computer systems mature during their lifetimes in terms of the range and quality of software that will run on the machine.
- The Psion software bundled with the QL has been markedly improved and is now very good. That will cover the business needs of the great majority of the QL's users. But there is a virgin market for all the fun programs that helped the Spectrum to take off, provided that they can be delivered quickly.

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NEWS

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The crystal ball

Radar Games of Dudley have released Confidential, a graphics and text adventure where you step into the world of a private investigator. Available now for the Spectrum and soon for the 64 and Amstrad, Confidential will be reviewed next issue.

A helping hand

Keith Foreman of Rugby has almost completed Colossal Cave but wants answers to the following:-
1. What should I do with the magazine "Spelunker Today"?
SUNO BARO FDNES TTIW TATI EVAE L
2. Where is the Pirate's chest?
a) NMUL OCEG NARO RAEN SEGA SSAP "EMA S" OF EZAM NI
b) UOYB ORET ARIP EHTT ELTS RIFU OYLI TNUT IDNI FT'N OWUO Y
3. Are the carpet and curtains in the Soft Room significant?
TIGN IKAE RBTU OHTI WNOE SAVE HTGN IPPO RDRO FYLN O

For the first time in any home computer magazine, here's some hints for owners of Infocom's new and utterly brilliant Hitch Hiker's Guide to the Galaxy:-
Robot grabbing the Babel Fish?
LENA PFOT NORF NILE HCTA STUP
Bugblatter Beast spotting you?
LEWO TEHT HTIW DAEH RUOY REVO C
Problems with the Vogon Captain's poetry recital?
YRTE OPYO HNE: NOIT AICE RPPA RUOY WOHS TSUM UOY
Yours in dungeons and danger,
Hugo North.

QUEST Corner

Our man with the brass lamp and the key to a thousand mysteries sheds light on new adventure programs. Lost? Never fear, Hugo North is here.

Tracer Sanction

- *Commodore 64*
- *Activision*
- *£9.95 Disc only*

YOU'RE THE highest ranking agent of the Stellar Intelligence Agency (SIA) and have been assigned to capture the Wing, the most notorious criminal in the galaxy.

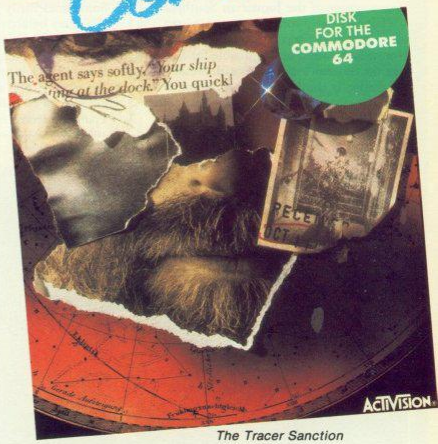
You begin in SIA HQ on the planet Mongo facing a sinister gent in sunglasses. Trying to take his shades away only results in getting slapped. And that's one of the good things about this adventure — you can examine and experiment with many of the objects and still get a sensible response.

Your spaceship is nearby — you'll need to buy fuel and a map of the galaxy. On the planet Sonex, a long line of people waiting at the Tourist Information Centre might snooker you. Waiting politely in line gets you nowhere fast — the queue moves slowly and people keep barging in.

Puzzles abound. A bartender is in a daze and having trouble remembering anything — a clear-cut case of amnesia. A ragged hermit gets hot under the collar if he catches you swiping a solar battery from his shack. Stalactites are none too secure — one false move and you're in danger of becoming a kebab.

Further into the galaxy, a neat "sword in the stone" puzzle may baffle you and an unsociable chap will try to shake you off a suspension bridge. In a park, an old gentleman feeding the pigeons tells you to "Get off my turf, crumb." Old age pensioners aren't what they used to be. If you're not careful, he'll whip out a magnum .45 and say "Go ahead — make my day." Of all the pensioners in the parks in all the galaxy, you have to pick on Dirty Harry's grandad!

The graphics are particularly good, a hi-res picture for every location. Some are animated — the rolling eyes of an angry hermit, a soaring fountain, and a flowing river for example. There's a wide vocabulary and response time is fast.



The Tracer Sanction

The Tracer Sanction is an enjoyable, medium-complexity adventure with several original wrinkles.

Bored of the Rings

- *Spectrum*
- *Delta 4*
- *£4.95 cassette, £6.95 Microdrive*

A MITE WEARY of Middle Earth look-alike adventures? Browned off with Baggins dopplegangers? Then this large (three-part Quilled game's the perfect antidote; it blows a gust of irreverent air right through the Shires.

Bored of the Rings is a delicious send-up of you-know-what. The author, Fergus McNeil, has done a superb job. Text is presented in an impressive character set, using green, blue, grey and white to splendid effect. There are some graphics but it's in the prose where the adventure excels.

Fag End, your uncle Bimbo Faggins house, bears a startling resemblance to a certain location in another adventure — does a round green door ring a bell? As you enter, you'll hear Grandalf in conversation with Bimbo: ". . . and so we'll need to get some dense lemming to take it and dump it where old eyeball can't get it." "But what stupid individual can we get for a suicidal folly such as this . . ."

As Fordo, a boggit, it won't be long before you're joined by a large company. Do these names sound vaguely familiar: Spam, Pimply, Murky, Legoland, Aragont, Borrower and Giblet? Later, there's a delightful sideswipe at the famous vending machine that appears in the classic Crowther and Woods adventure.

Eating some magic beans has a strange side effect: Fordo sees a squadron of pink elephants flying past, pursued by brightly glowing traffic wardens., "Coroner's verdict: overdose".

This is an extremely funny adventure. If you like a good laugh then get this at once. It's only available by mail order (048 93 5800) and deserves to be a massive success. Excellent.

Assassin

- *BBC B*
- *Robico Software*
- *£9.95 tape, £11.95 disc*

JUST ROOM for a brief mention of Assassin, a machine code text adventure. It has a fairly sophisticated command parser that allows input of a more complex nature than the usual verb plus noun.

Using text compression techniques, the game offers over 220 locations to explore, many characters to meet and a host of puzzles to solve. The game comes attractively packaged and includes an adventurer's notebook and card entitling you to help should you get stuck.

WELCOME TO Birdy, a challenging Spectrum machine-code game for anyone — though it's no longer than 6.5K, it runs on 48K models only.

You are the humble but brave little Birdy — a Birdy being a rare breed of penguin, very fond of ice, but you won't find him being friends with an Uglie.

Birdy likes adventure. And that's the reason why you'll find him collecting diamonds on the frozen wastes of the Jupiterian Southpole.

There is only one slight problem: the extremely high gravitation on this planet. Normally it would be impossible for Birdy to take the enormous diamonds with him, but the gravitation is eliminated by a levitation power that arises from a combination of three of these precious stones in a row.

That's why he must push the diamonds over the icefields in order to join three of them.

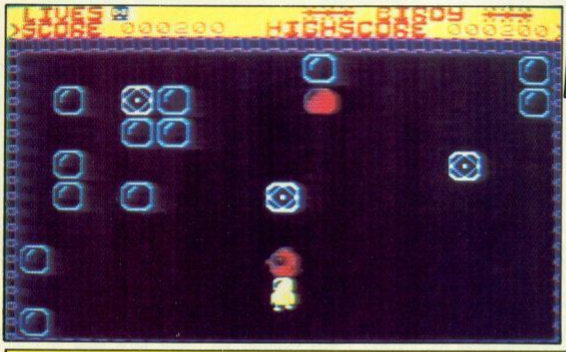
This would be simple if there weren't any Uglies in the neighbourhood . . . These nasty tomato-like creatures don't like Birdy taking away their diamonds, so beware those fellows!! Lucky for our hero, they are not too intelligent.

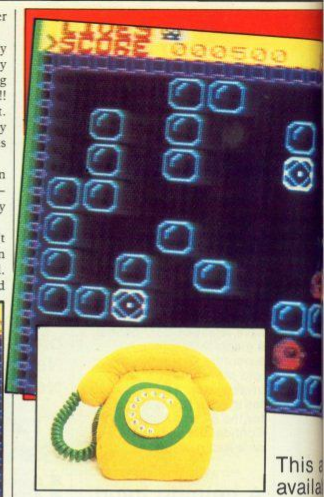
To help the Uglies to The Other World Birdy can squeeze them with one of the numerous blocks of ice lying around in the screens.

Sometimes Birdy can, for a while, make an Uglie dizzy by activating the electric fence — that means punching it — when such a nasty creature is wobbling along it.

If an iceblock is pressed by Birdy but it can't move, then it will fall to dust. Note that an Uglie cannot be killed by a sliding diamond.

Points are scored for squeezing the Uglies and



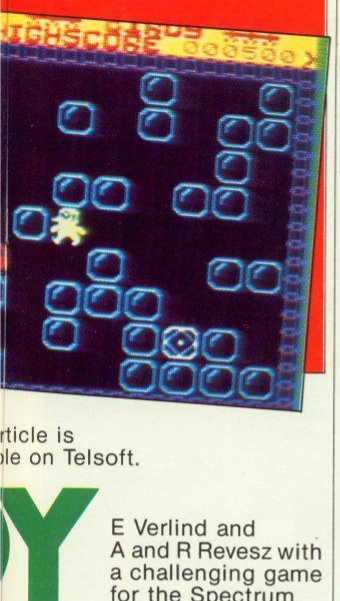


This a
availa

BIRD

Listing 2.

```
  10 GO TO 540
  20 INK 7: PAPER 1: BORDER 3: C
LS : SAVE "BIRDY-CODE"CODE 49536
,6520
  30 PRINT "** VERIFY (YES/NO)?"
  40 IF INKEY$="N" THEN RETURN
  50 IF INKEY$<>"Y" THEN GO TO 4
0
  60 PRINT '' FLASH 1;"** PLEASE
 PLAY THE TAPE"
  70 VERIFY "BIRDY-CODE"CODE 495
36,6520: PRINT '''"VERY WELL!!":
PAUSE 25: RETURN
  80 INK 4: PAPER 0: BORDER 1: C
LS
  90 PRINT '': FLASH 1;"** START
 YOUR RECORDER.."
  100 LOAD "BIRDY-CODE"CODE 49536
,6520
  110 PRINT '''** GOOD OLD QUALIT
Y!": PAUSE 25: RETURN
  120 INK 0: PAPER 7: BORDER 4: C
LS
  130 LET a=10: LET b=11: LET c=1
2: LET d=13: LET e=14: LET f=15
  140 PRINT "** Type number of FI
RST block    to enter ";: INPUT b
eg: PRINT beg: IF beg<>INT beg O
R beg<0 OR beg>101 THEN GO TO 14
0
  150 PRINT '"** Enter number of
LAST block    to enter ";: INPUT
end: PRINT end: IF end<>INT end
OR end<beg OR end>101 THEN GO TO
 150
  160 PRINT ''You want to enter b
lock ";beg;: IF beg<end THEN PRI
NT " to ";end
  170 PAUSE 50: CLS
  180 RESTORE : FOR n=1 TO beg: R
EAD sum: NEXT n
  190 FOR n=beg TO end: READ sum
  200 PRINT "TYPE IN: BLOCK ";n:
PRINT
  210 INPUT LINE b$
  220 PRINT b$
  230 IF b$="QUIT" THEN RETURN
  240 IF LEN b$=128 THEN GO TO 26
0
  250 PRINT : PRINT FLASH 1;"* YO
U MADE A MISTAKE, TRY AGAIN!":
GO TO 200
  260 FOR g=1 TO 128: LET k=CODE
b$(g): IF ((k>=48) AND (k<=57))
OR ((k>=65) AND (k<=70)) THEN NE
XT g: GO TO 280
  270 GO TO 250
  280 BEEP .1,12: BEEP .1,-12: LE
T t=0
  290 FOR G=0 TO 63
  300 LET v=16*VAL b$(2*g+1)+VAL
b$(2*g+2): POKE 49536+n*64+g,v
  310 LET t=t+v
  320 NEXT g
  330 IF t<>sum THEN PRINT ' FLAS
H 1;"* CHECKSUM ERROR, TRY AGAIN
!!!": PRINT : GO TO 200
  340 PRINT "O.K. ""----------
----------------"
  350 NEXT n
  360 RETURN
  370 INK 0: PAPER 6: BORDER 2: C
LS
  380 PRINT AT 3,11;"* MENU *"
  390 PRINT AT 8,3;"1  -   ENTER
HEX-CODE";AT 10,3;"2  -   SAVE B
YTES";AT 12,3;"3  -   LOAD BYTES
"
  400 PRINT AT 20,2; FLASH 1; BRI
GHT 1; INK 4; PAPER 7;"* PLEASE
MAKE YOUR CHOICE *"
  410 LET K=CODE INKEY$-49
  420 IF NOT K THEN GO SUB 120: G
O TO 370
  430 IF K=1 THEN GO SUB 20: GO T
O 370
  440 IF K=2 THEN GO SUB 80: GO T
O 370
  450 GO TO 410
  460 REM * DATALINES'-CHECK *
  470 LET T=0
  480 RESTORE
  490 FOR N=0 TO 101
  500 READ D: LET T=T+D
  510 NEXT N
  520 IF T=621249 THEN RETURN
  530 BEEP .7,24: BEEP .7,0: BEEP
 1.5,-48: PRINT FLASH 1; BRIGHT
1; INK 4; PAPER 0;"* ERROR IN DA
TALINES. AAARG!!": STOP
  540 CLEAR 49535: POKE 23650,8:
GO SUB 460: GO TO 370
  550 DATA 2509,2526,5520,3573,73
51,5984,5935,1947,7339,7193
  560 DATA 7634,6608,5529,6769,69
09,8803,8058,7959,7481,7880
  570 DATA 7171,6493,7114,6137,72
92,7783,8658,7779,7341,7759
  580 DATA 6018,6977,5997,5910,75
26,7706,6708,7023,5986,7426
  590 DATA 7113,8351,7609,8180,82
33,5474,6377,9340,7924,7699
  600 DATA 8183,7802,5787,5561,75
79,6809,7375,7380,7423,7116
  610 DATA 7191,6743,7454,6950,68
23,6976,7089,6405,8721,7477
  620 DATA 5615,5692,5032,5491,59
56,2785,549,2722,3068,2643
  630 DATA 1324,3320,3673,3742,36
71,2454,3318,3491,4198,4049
  640 DATA 1394,584,6161,4344,411
9,6814,7896,7325,7115,6672
  650 DATA 5938,6571
```



rticle is
ble on Telsoft.

Y

E Verlind and A and R Revesz with a challenging game for the Spectrum.

for placing the three diamonds in a row. The latter will give you the greatest number of points. Reaching 5000 points will be rewarded with a bonus-Birdy.

You can control your Birdy with a Kempston joystick or with cursor-keys. For playing the game only the four directions are used: pressing zero — or fire — will cause a break that enables a player to return to Basic. Please note that we can't guarantee the machine code won't crash if restarted after a return to Basic!

Take two blank tapes: one for the program itself and another for the saving of the hexloader and the bytes as far as typed in.

Enter listing 1 — the loader program that draws a loading message on the screen — and then loads the entire machine code block. Save this one to tape 1 after having entered it.

Now type in the hexloader — listing 2. It's safe to save this one to the other tape before starting to work with it. After this is successful, the nicest part of the job has to be done: typing in the hexdump.

First Run the hexloader, you will see a menu now: select the input-option. As you have probably seen already, the code is divided into 102 blocks of 64 bytes (= 128 characters = 4 lines), numbered 0 to 101. If you are at this point for the first time, type 0 for the number of the first block to enter.

Have a little patience

If you know what the last block you'll enter today is, type it when the Spectrum asks for it, otherwise simply enter 101. Then you have to do the real work.

Please have a little patience after having entered a block: the computer checks your input and that takes a little time.

We think that you won't type all in in one go: if you want to stop entering code type Quit when your machine asks for the bytes of a block: you will see the menu again.

Choose save to save the code to a tape and please remember the number of the last block you entered. Next time, Run the hexloader again, choose the load option and continue entering until you've finished it all. Save the complete code after the loader — listing 1. The game is now ready to be played!

We really hope you like this game and we think you will, but we can also imagine that you don't want to enter 6.5K of code. If so, you can send a letter to us Dutchies and we'll send you a copy on cassette. Please send £3 with your letter. For that you'll receive a Birdy copy with a beautiful loading-screen drawn by Alex and we also pay the postage overseas for sending the tape. Our address is: "Birdy", E. Verlind and A. + R. Revesz, Waalstraat 3, 7333 JR Apeldoorn, The Netherlands.

Listing 1.

```
  10 REM ****************
  20 REM **** BIRDY! ****
  30 REM ****** BY ******
  40 REM ** E. VERLIND **
  50 REM ** A. REVESZ  **
  60 REM ** R. REVESZ  **
  70 REM ** MAY 1985 **
  80 REM ****************
  90 INK 7: PAPER 0: BORDER 0: C
LEAR 49535: GO SUB 210
 100 PRINT #0: 1985 VERLIND & RE
VESZ BROTHERS"
 110 INK 0: PRINT AT 0,0: LOAD
"BIRDY-CODE"CODE 49536,6528: POK
E 23606,128: POKE 23607,192: POK
E 52983,128: POKE 52984,2: POKE
53012,65: RANDOMIZE USR 50048
 120 READ D$: LET L=0
 130 PRINT AT Y+L,X;
 140 PRINT CHR$ (CODE D$(1)+63);
: LET D$=D$(2 TO ): IF D$(1)="#"
 THEN RETURN
 150 IF D$(1)="*" THEN LET L=L+1
: LET D$=D$(2 TO ): GO TO 130
 160 GO TO 140
 170 LET Y=3: LET X=2: INK 6: GO
SUB 120
 180 LET Y=9: LET X=12: INK 5: G
O SUB 120
 190 LET Y=16: LET X=2: INK 4: F
LASH 1: GO SUB 120: FLASH 0
 200 RETURN
 210 INK 2: BRIGHT 1: LET P#="**
****************************";
 PRINT AT 21,0;P#: PRINT AT 2,0;
P#: DIM P#(32): LET P#(1)="*": L
ET P#(32)="*": FOR Y=3 TO 20: PR
INT P#: NEXT Y
 220 BRIGHT 0: GO SUB 170: PLOT
15,49: DRAW 225,0: DRAW 0,-32: D
RAW -225,0: DRAW 0,32: RETURN
 230 DATA "AAAAMMMAEMMIMMMAMMIAI
AEIAAAA*AHLAFMNCAFKAPAFKPAHIHMLA
AHLA*BHLCPAFKAFKAPDPAFANCAPAABHL
C*ADDADDDABDDCDABCDDCAADAAADDA#"
 240 DATA "EMMIEMMA*AFKAHMMA*AFK
AMAFK*BDDCBDDA#"
 250 DATA "MAAAEMMAEMMAMMIAEMMIM
AEIEMMA*PAAAFAFKPAFKPAHIAFKAPOFK
PABC*PAAAPAFKPDHKPANCAFKAPBPKPBH
P*DDDCBDDADABCDDCABDDCDABCBDDA#"
 260 REM * U-CASE LETTERS!
```

Hexdump.

```
BLOCK 0
00000000000000000C1C1C1C1C001C10
0066664400000000247E24247E2400
0C7F7F6C7F007F7E006264001026400
3020301035b47E3b0E0E1C000000000

BLOCK 1
060E101010100E0E3030C0C0C0C3030
266618FFF1866640 0C1C7F7F7F1C10
00000000000E0E1C000003F7F7E0000
00000000000C1C1B010307 0E1C307060

BLOCK 2
3F7F676b73637F7E3C7C6C0C0C0C7F7E
3F7F431F7C607F7E3F7F431E1F437F7E
2666666667F7b63F7F607F7F037F7E
3F7F607F7F637F7E3F7F070E0C0C1C10

BLOCK 3
3F7F637F7F637F7E3F7F637F7F037F7E
0C1C1C00001C1C1B0C1C1C001C1C3C30
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BLOCK 4
9FB1E0CED09C989E3F7F63637F7F6362
3E7F637E62637F7E3F7F636b0b637F7E
3E7F67636367 7F7E3F7F607C7C607F7E
3F7F6070 7C6b0b403F7F636b0F637F7E

BLOCK 5
2363637F7F6363623F7F1C1C1C1C7F7E
1F3F030363637F7E23666D7070b0C6662
307070707070 7E377F7F6b6b636362
23637370b6F676362 3F7F636363637F7E

BLOCK 6
3F7F63637F7E6060 3F7F63636b677F7E
3F7F63637C7F6766 3F7F607F1F437F7E
3F7F7F1C1C1C1C1B23636363637F7E
2363636363637E1C23636363b7F7762

BLOCK 7
2163361C103C6742236363F7F037F7E
3F7F060C1B307F7E0000000000000000
0000000000000000000000000000000
00103B541010100000000000000000
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BLOCK 8
ED73B2D43E01327ED43E02CD0116CD47
D13E03325bD4AF3280D4FB3E01D3FECD
32D30E46CD4FD33E400B0CDBCD23ECDCD
01D3FD3b5546013100115 4bDcD3C203E

BLOCK 9
F7DBFEF6FC2FFE002BF53D327FD43E01
32b7D4AF325 7D4329ED5329FD5324b05
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0D36003A67D4FE0920043C3267D421AC

BLOCK 10
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2336 00CD11CBCDBECBFBCDBBD0CD77CC

BLOCK 11
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BLOCK 12
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BLOCK 13
BCD419116D47E124723137E1223137E
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E6D33264D4002158D43A63D4B65F233A
61D486CDE6D3326 5D447000BFE402B05

BLOCK 14
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65FE012003216F67CD68CB3A64D4FE36

BLOCK 15
CAD0CBFE503805FE64DA0CCE3A65D4FE
50380 5FE64DA0CCE215BD43A5AD4B786
325ED45F233A5B D4B786325PD4CDE6D3
FE42CAC6CFE46C0AF3266D4215ED43A

BLOCK 16
62D4B65F233A6D486CDE6D3FE20203C
215ED43A63D486 5F233A61D486CDE6D3
FE2020201 00FA0378B120FB20E5D4CB
7ACDB4D3215ED4 3A5AD4B67723 3A5BD4

BLOCK 17
B677CD7DCB3E0132 66D41B80FE643004
FE4F3B623A66D4FE01CB00CDEDC50100
F00378B120FB3A5FD4CDB4D3C93A5ED4
4F3A5FD42E3ECD6D533A5FD43C2E3CCD

BLOCK 18
05D300FE002010810A1921FF00110A00
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38CDB5D359C9205A04226DD4215ED43A

BLOCK 19
6DD4B70326BDD4B233A6ED4B786326C
D406FF21BDD4DD21A1D40423DD235FAF
DDBE007B20FA0E20FF1E21F6FF1900BE
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BLOCK 20
855F3A6BD4B4CDE6D3FE20203210 0FA
0178B120FB3A5ED45F3A5FD4CDB4D301
6BD4115ED4216DD40A0B4021A6B120313
230A0B4021A6B12CD7DCBCD44CC10BBFE

BLOCK 21
643017FE4C3813ED4B6BD42A69D4EB21
8D4197111B0A0019 70C92A69D4EB21A2
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00110021193D20FCEBCD41D03A5ED45F

BLOCK 22
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6ED4B677CD7DCB215FD43A6ED4FE002B
333A6DD4B6326CD4216BD44E2E4DCD85
D3216BD4 5E236E1E5B2600029292929

BLOCK 23
19AF0600000000 10FBD3FE772C772D3D
20F018447E3255D42B3A6D2D4B63254D4
11785ECD6BD32155D4341E70CD6BD33A
55D43B6F3A54D45F16 5B26002929292
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· THE NEW AMSTRAD CPC 664 WITH BUILT-IN DISC DRIVE

· THE NEW AMSTRAD CPC 664 ·

· AVAILABLE AT BOOTS · COMET · CURRYS · DIXONS · GREENS · JOHN MENZIES · RUMBELOWS

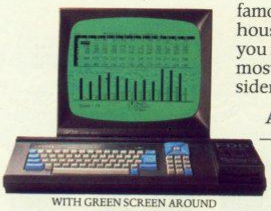
If you know anything about computers you'll know that disc drives are up to fifty times faster than cassette when you're loading and saving programs. In fact, a disc drive makes computing faster, more reliable, more efficient and more fun. But up till now the only way to gain these advantages for a home computer was to buy a separate disc drive attachment. Now Amstrad are pleased to announce the first complete home computer with built-in disc drive: The Amstrad CPC 664.

And when you buy a CPC 664 you'll find it's not just the disc drive that's built-in.

You'll get everything you need, including a monitor (green screen or full colour). We'll even give you a free CPM and Logo disc, so all you do is plug in and you're in business.

WITH COLOUR MONITOR AROUND

· £449 ·



WITH GREEN SCREEN AROUND

· £339 ·

THE HOME COMPUTER THAT MEANS BUSINESS.

BUSINESS OR · PLEASURE ·

Although a disc drive will make games more fun (and there are loads of them to choose from) it also makes the CPC 664 a serious proposition for the business user.

There are accounting, word-processing, spread-sheet and data-base programs (to name but a few).

Amsoft Business Control, is a complete suite of programs for integrated sales invoicing, stock control and sales ledger for around £99. (Requires an additional FD-1 disc drive around £159 and DL-2 cable around £7).

The CPC 664 is also supplied with CP/M* to help make your business more efficient and effective by providing access to the famous range of CP/M* software.

HIGH PERFORMANCE · LOW COST ·

Wordprocessing with Amsword can improve the productivity of everyone from unskilled typist to trained secretary. Around £23.95.

The one thing you won't need a computer to work out is that the Amstrad CPC 664 represents outstanding value for money.

You only have to check the cost of buying all the elements separately (64K computer, disc-drive, monitor) to realise that the Amstrad package is very hard to beat.

With a green screen monitor the cost is just £339. With a full colour screen it costs £449. And after you've saved money on the price of the computer itself, you go on saving on the price of software.

There are hundreds of programs for business or pleasure available on disc (and cassette) to CPC 664 users. Many from Amsoft, others from other famous-name software houses. Few will cost you more than £49 and most will cost you considerably less.

AN EXPANDING · SYSTEM ·

There is a complete range of peripherals available to CPC 664 users which plug directly into the built-in interfaces.

These include a joystick, additional disc drive (to double your on-line storage) and the Amstrad DMP-1 dot-matrix printer. (There's also a cassette interface so that you can use CPC 464 programs on tape). And there are many more peripherals from Amstrad and other manufacturers which can be used to enhance the CPC 664.

· AMSTRAD USER CLUB ·

Join the optional Amstrad User Club and we'll keep you informed with our monthly user magazine, and information on all software as it is introduced. Your membership details will be recorded on your personal club card, which entitles members to various privileges and offers.

Figure analysis made easy with Microspread. An easy to use spreadsheet with pull-down menus and a wide range of mathematical options. Around £49.

Please send me more information

Name _____

Address _____

_____

_____

Amstrad CPC 664

Amstrad, P.O. Box 462, Brentwood, Essex CM14 4EF.

YC/664/2

*CP/M is a trademark of Digital Research Inc.

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BLOCK 24
2919E5DDE1AF0000000000000000FD7FEDD
7000D77200DB0EE3E04D3FE3A5ED45F
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BLOCK 25
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BLOCK 26
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BLOCK 27
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C00DBE02C0DD21B9DAD7E00DDBE0130
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BLOCK 28
700ED04A0D7D7D0D7000DD7E01DDBE
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BLOCK 29
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BLOCK 31
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035013FE0120022E5F11200004143E00
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BLOCK 33
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04D5FE21C05A3E2772C20FC21065001
7100712C10FC2E4211A05A3E4306207
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BLOCK 34
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BLOCK 35
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BLOCK 37
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BLOCK 38
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BLOCK 39
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BLOCK 40
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BLOCK 41
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BLOCK 44
0125A69D4EB21A2D419AFBE2B13511
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FD36000CD44CC1B0CD4216D4419AFE2004
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BLOCK 46
0B7FFBE2002E1D0E2D1BCD4191D4D7E
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2BA27070FFE4730 2FFE43302BCD2E04
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BLOCK 47
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BLOCK 48
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BLOCK 49
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BLOCK 51
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BLOCK 52
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E4A7FE01D0A4D3E3D1D1D4FE2200443E35
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BLOCK 53
FE0020FBFE3E0000A1D100FE35202F
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0004 5E5A100AFE5B2D0AFE4D2002 5E20
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BLOCK 54
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BLOCK 55
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7700 1AD07F2B1BDD2B1FCD2B1D2B0E
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1300114ADFD56 5FCD3C2006A0DD21
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BLOCK 56
54D4DD36107218D5DD36000578C5E5
07B7D76D005F163DCD6BD3DD36000E1
06D7E5C57D7D7D7D7D7D7D7D7D7D7D7D
E12DD34001DE5DD36001411EEFF19
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BLOCK 57
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0110B6010000D7B012DF03A7FAFEED
2000 3EFDDFDE2A7FDDE7AFDB1FFE10
5BF9C9110300DD21A4D5D6D53A9ED5DD
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BLOCK 58
BE00781C3D5A9FD5D0D6E1D10BAC83A0D
D5DDDE2200DDD19110E13C7D9D0A7E
C8A020D0C2E4BF97B7A7E3D6E6FDFC6
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BLOCK 59
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BLOCK 61
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BLOCK 64
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BLOCK 65
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0A32AED5FCDD4DCD9DD2210001226D
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BLOCK 67
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BLOCK 68
CD84D210A0E225ED4CDB3C0FB3E0A0a
5073BFE0F0010 9AF2B10A C9DD215B
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BLOCK 69
0D225A400AFB0CD5CD3F1F56F261722
5A4D4D0CD5CD3F1CFE230DDFAFF5
072E00225A4D0AFB0CD5CD3F1F56722E
1F2D54D0AFB0CD5CD3F1CFE187BDF
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BLOCK 70
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BLOCK 72
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BLOCK 73
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7DFE2D0D0D0D0D0D0D0D1CAFD0D077
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BLOCK 75
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5D7A6D11D0D0D0D0D0D0D0D0D0D0D0D0D0D
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BLOCK 76
0000000120000000000000000000000
0000000000000000000000000000000
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BLOCK 77
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BLOCK 79
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BLOCK 80
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BLOCK 81
595916000024C495645551 6001A2DA
2A2D42495245952D2A2D2D2D3E5343
4F52452D3D3D3D3D3D3D3D3D3D3D3D
5347AF5245D3D3D3D3D3D3D3D3D3D3D3D
---------------------------------
BLOCK 82
2D2D2D2D2D2D2D2D2D2D2D2D1602045553
4520AC45445D2D2D2D4947485420414E
4420SA45524F16D3D3E544F20454E54
45522D594F55522D494E49544941CD53
---------------------------------
BLOCK 83
3C1D2D2D5A4F4441592725322047524541
54455354160D4D2D4D2D4D2D4D2D4D2D
45205345C45445354494F4E16D0D3120
4B455924AF41524416DF0A322D4B5540
---------------------------------
BLOCK 84
5D5554AF4E16D0DE44454DAF16D2D142
5D5544AF4E7D4D5AD4B52D4D4D4D4D4D4D
15D05D4AF5245D3D2D2D2D2D2D2D2D2D
494E5D5316D2D15D5D4C415420544B45
---------------------------------
BLOCK 85
2D5D4AC4D4D4D4D4D4D4D4D4D4D4D4D4D4D
2D5D4AC4D4D4D4D4D4D4D4D4D4D4D4D4D4D
15D72D2D5D4D4D4D4D4D4D4D4D4D4D4D4D4D
---------------------------------
BLOCK 86
0D66A10D5112D0D4E2D7D5C42D0D5D2E0D
C42D0D4E2D7D5112D0D66A10D5112D0D4E
2D7D5C42D0D5D2E0D5C42D0D4E2D7D5112D
0D4E2D7D5C42D0D5D2E0D5C42D0D4E2D7D
---------------------------------
BLOCK 87
C42D0D5D2E0D5C42D0D4E2D7D5112D0D4E
2D7D5C42D0D5D2E0D5C42D0D4E2D7D5112
D0D4E2D7D5 7D5112D0D4E2D7D5112D0D4E
2D7D5112D0D4E2D7D5112D0D4E2D7D5112
---------------------------------
BLOCK 88
3E02E7D4000007C55405C8D5D5C8D5D5
2540049256005C8D5D5C8D5D5C8D4920
4004F4D0D2D0D44F2E0492204044F26
0D7D5D0525200D5C81D0525200492204D5
---------------------------------
BLOCK 89
2540075400D5C8D5D5D0525200492
4005C8D5D5C8D5D5C8D5D5C8D4004F26
0D7D5D0492204 4F2605240005C8D5D5
CBE7FF000000000000000000000000
---------------------------------
BLOCK 90
0000000000000000000000000000000
0024240000000000247E24247E2400
0000E3E2D3E3E0000626400D1E2D0D0
0010210D6443540000000100000000
---------------------------------
BLOCK 91
0000000000000000000100100100000
000014003E0140000000003E000000
0000000000000100000000003E000000
0000000000100000000000000000
---------------------------------
BLOCK 92
003C6A6A5A2323000018200000003E000
FEF7E3FFFDFE3BE5F5F7F7B7776E5D
048E0404042020CB0A00700400
E77E4242424276E7005204040451004A5
---------------------------------
BLOCK 93
012641341C5209500000000000400000
0000000000210 5AA6A6E1206A4CF000
44544A0A6381F000F00C7A0240707
001F32647055944206A0122246DCF00
---------------------------------
BLOCK 94
015B4B4A6231F0000F00C4622120B6
001F31624440B5610202020202C0F000
4040404040301F0000F00C0202020202
001F3B6344C4040F1E3C7BF001C3B7
---------------------------------
BLOCK 95
3333CC3333CCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
FCFEF72337FFFEC3F7FEFC4EC7FF7F
E7E7A7BFDF7E3C3C7EFFDA5A5DBFF
---------------------------------
BLOCK 96
1F7FDFFF7FFFFFEE0ECF1FFFEFEFF7F
000401000FBC3640041401001F31AC
7DFCF4FAECBF000F13B3F3F3F1F0F00
00C0E0F0FCFC7C7C000307F1F3B7F1
---------------------------------
BLOCK 97
BF1CFCFCFCFCF000E3E3F2F2371F0F00
00C0E0FB01ECC0F000307 0F1F3E3E3E
FEFEFEFEFCF000007F7F7F7F3F1F0000
0000F0FFCFCFEFEF0000F1933676F6F
---------------------------------
BLOCK 98
FE7E7EFEFCF000005F5E5E6F3F1F0000
0000F0F9C6E2E9E0000F1F39767479
F1FFFEFEE0000000000B1B3B3F0F1B00
0000000CFCFD0B000FFF7F0F0701000
---------------------------------
BLOCK 99
FCFEEAF0F0B3B130SF7776F0E2C3010
60F0BF0B0C0E0C0F1E3D33BF06C1D
A0A0A0BF0F0000000000000000000107
E0F0505000000C0F0C0B0917CF8F0F
---------------------------------
BLOCK 100
FCEEF6F0F0341C10F77070F1E1C100C
F70B0CCCF0E030B00F1F1F1F1F1F0707
0000000000000000000000000000000
E0F0D0930SF0F0F0F0F0A00A0B0707
---------------------------------
BLOCK 101
F0F0BF0FBEB20707F1F1F1F1F1704000
0F0F0F0F0F0F0B070B0000000000000
0F0F0F0F0F0F0707000F1F1F1F1F704000
E0F0F0500F0B0F0F0F0F0A00F0F0B0F
---------------------------------
BLOCK 102
0000000000000000000000000000000
0000000000000000000000000000000
0000000000000000000000000000000
0000000000000000000000000000000
---------------------------------
BLOCK 103
0000000000000000000000000000000
0000000000000000000000000000000
0000000000000000000000000000000
0000000000000000000000000000000
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BLOCK 104
0000000000000000000000000000000
0000000000000000000000000000000
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BLOCK 105
0000000000000000000000000000000
0000000000000000000000000000000
0000000000000000000000000000000
0000000000000000000000000000000
```

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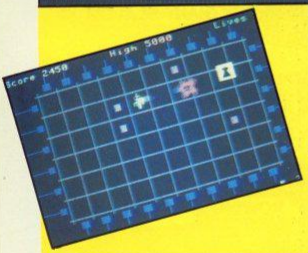

IMPULSE

Keith Suddick finds something fishy at the chip factory and gets his CBM-64 to help.

This program is available on Telsoft.

SOMETHING HAS gone very wrong down at the chip factory — silicon chips that is, not fish and . . . — All of the memory circuits have started forgetting the data that they are supposed to be remembering!

In a desperate attempt to find out what has gone wrong and hopefully put it right, Floyd the droid has been miniaturised and put onto the surface of one of the faulty chips. The problem soon becomes obvious as the circuit is invaded by program bugs and data locks which roam across the chip, both trying to turn any data they find into garbage. As if the bugs and locks weren't enough, worse still are the sparks which shoot across the chip from the contacts on either side.

Floyd can destroy bugs

Luckily Floyd can destroy the bugs and the locks by firing packets of random data at them but nothing has any effect on the sparks. Add to this the fact that if Floyd is caught by any of his adversaries then his own circuits will be scrambled, and you can see that he might need some help!

At the start of each screen Floyd will appear in the top left hand corner of the chip, a joystick in port number 2 will control his movements and the fire button will fire a packet of random data.

The chip itself is organised as a 10 by 6 matrix of memory cells each able to hold a packet of data. The data is supplied to the chip from outside and is stored in any unused memory cell. Floyd will not harm the data in any way but if any of the other characters find any data then there is a good chance that they will interfere with it and turn it into useless garbage.

You start the game with three droids, scoring 50 points for each bug you destroy and 100 points for each lock, remembering that you cannot destroy sparks! Each screen is completed when the memory chip is full, including garbage, then you will score 10 points for every unharmed data packet retrieved from the chip.

Bonus of 100 points

Should you save 75 per cent or more of the data — 45 cells or more — then there is a bonus of 100 points per valid data packet. 10,000 points or more will earn you an extra droid.

On the first screen you will find only one bug to contend with but with each successive screen up to level 8 a different combination of enemies will appear. After level 8 the screens will cycle through the patterns for screens 5 to 8 but the degree of difficulty will be increased by speeding up the movement of the bugs. A small flag in the bottom right hand corner of the screen indicates the current level of play.

At its most difficult level the game uses all eight of the 64's sprites thus Basic by itself would not be able to support the game so the program makes use of several machine-code routines to deal with the animation of the characters and some of the otherwise lengthy operations. Unfortunately this generates a lot of data statements and requires quite some time to read them — although this is only done once when the program is first run.

It is, as always, the case that Commodore control characters such as cursor movements and colour codes, do not lend themselves to dot matrix printers followed by photographic reduction and although anyone who has used Commodore machines for any length of time, will probably have gotten used to them, I have tried to make things easier by including details of almost all the control characters used in the program in Remark statements directly after their use.

Don't type Rem statements

These remarks should not be typed — they will at best slow the program down slightly and at worst cause an out of memory error because I have placed the video chip data directly after the program area.

Table 1 describes the abbreviations I have used to explain the control codes. As usual, if you type the program then be sure to make a copy of it before you run it, if you would rather not type it then I can supply cassette copies for £2.50. Please write to: Keith Suddick, 6 Ravel Court, Jarrow, Tyne & Wear, NE32 3BW.

Program breakdown.

0-90	Initialisation for the program, game and screen respectively. Sets top of memory, sets up video and sound chips ready for game.
100-210	Main program loop. Fills screen with data packets, checks status of bugs etc. and either removes them or generates a new one as required.
300-310	Makes beep and hiss sounds respectively.
400-600	Generates details of new bugs, locks and sparks respectively.
700-790	Deals with the loss of a droid. Flashes Floyd sprite and either begins the screen again or ends the game depending on how many droids are left.
800-860	Plays fanfare at the completion of each level.
1000-1999	Draws the chip and the rest of the game screen, blanking the screen during drawing.
2000-2040	Generates at random the positions on the chip that the data packets will fill. This is only done once at the start of each screen to save time.
4000-4280	Called at the completion of each level to collect data from the chip and award points and bonuses as required.
5000-5010	Adds points onto current score, updates high score if needed and prints new values on the screen.
6000-6080	Game over message, gives options to play again or review the instructions.
8000-8080	Initialise title string and displays "please wait" message.
8100-8120	Dimensioning of arrays.
8200-8270	Initialise constants for future use.
8300-8320	Initialise strings.
8400-8490	Read data into arrays and memory as required. Call machine code routine to reset the video bank and access the character set.
8500-8550	Calculate array elements for use in generating new characters.
8900-8999	Installs IRQ routine vector and calls instruction routine, then starts the game.
9000-9140	First screen of instructions.
9160-9290	Second screen of instructions.
9700-9710	Sets up the video chip with requested data.
9800-9820	Flashes sprites during instructions.
9900-9990	Prints instructions, waits for space bar then clears the screen.
10000-10090	Video chip set up data.
11000-11090	Animation data.
12000	Colour codes.
13000-13050	Data for machine code initialisation routine.
14000-14030	user defined character data.
15000	Sound chip set up data.
16000-16470	Sprite data.
17000-17410	Data for other machine code routines.

Table 1.

cd	cursor down	ron	reverse on
cu	cursor up	rof	reverse off
cl	cursor left	clr	clr
cr	cursor right	hm	hm
blk	ctrl + 1	org	G + 1
wht	ctrl + 2	brn	G + 2
red	ctrl + 3	lt.red	G + 3
cyn	ctrl + 4	gray1	G + 4
pur	ctrl + 5	gray2	G + 5
grn	ctrl + 6	lt.grn	G + 6
blu	ctrl + 7	lt.blu	G + 7
yel	ctrl + 8	gray3	G + 8
s/	shift + the following character		
c/	ctrl + the following character		
=/	G + the following character		

Numbers if present indicate the number of repetitions:
e.g. 4s/* means 4 shifted asterisks.
15cd means 15 cursor down.

```
0 Poke56,68 clr:run8000
1 lv=0 tl=0 nf=3 ge=.85 ex=11000 :goto5760
10 Pokei,.. ws%. :gosub9700 :gosub2000 :gosub1000
20 dv=(lvand63)-c4*(lv>c3)
30 fors=0to15 Pokesc+16+s,15(x>) :Pokesc+x,s%(dv,x>) :next
40 fors=0to24 Pokesi+s,s%(x>) :next
50 sf=60-c4*int((lv-c5)/c4) :ifsf<32thensf=32
60 rd=60-lv :ifrd<,thenrd=, :ge=,7
80 Pokeaf,sf :Pokese,u :Pokeic,u :Pokefk,.
90 i=fre(0)
100 Printleft$(vt$,asc(v$)):tab(asc(u$)):da$
110 x$=mid$(x$,c2) :x$=mid$(x$,c2) :di=c4*rnd(.)*du :ifx$="*"then4000
130 dim(u-ifdi),then100
140 forx=2to7 :ifpeek(sc+x)=,thensyss8,x :xd=sd+x :gosub130
150 next :ifrnd(.)>0thensyss9
160 ifPeek(fk)then700
170 goto130
180 ifrnd(.xd)*14thenPokeyd,15 :s=50*(u-(x>c3)) :gosub310 :goto5000
190 xc=sc+x :ifpeek(xd)thenPokeyd,. :Pokeic,c5 :rnd(.) :next :return
200 onxgosub0,400,400,500,500,600,600
210 Pokeyd,xd :syss9,x,x,x :syss11,x :Pokeic,.nc :ifrnd*(rnd)*c2/3goto300
300 Pokef2,ff :Pokev2,wb :Pokev2,wb+u :return
310 Pokev3,wn :Pokev3,wn+u :return
400 p=int(rnd(.)*hr) :gx=kx(p) :sy=ky(p) :nd=hd(p) :nc=ht(p) :Pokesc+x,hh :return
500 p=int(rnd(.)*dr) :gx=dx(p) :sy=dy(p) :nd=dd(p) :nc=dt :Pokesc+x,dd :return
600 p=int(rnd(.)*wr) :gx=wx(p) :sy=wy(p) :nd=wd(p) :nc=wt :Pokesp+x,vv-(p<10) :return
700 Pokeic,.:Pokese,u :Pokesi+19,12 :gosub310 :Pokesi+12,0 :Pokesi+13,244
711 rem                                                    ↑ clr
720 Pokev2,wb :Pokef2,12 :Pokev2,wb+u :ford=1to400 :next :Pokev2,wb
730 Pokef2,6 :Pokev2,wb+u :ford=1to400 :next :Pokev2,wb
740 ifextheniftl>exthennf=nf1-ex+,
750 Pokese,. :nf=nf-1 :ifnf=,then6000
760 Print"■■■
```

(continued from previous page)

```
1131 rem                    : tcd 9rax3 =/n red =/v 9rax2
1999 Pokede.27 return
2000 s$="":y$="":for=0to(r-1)
2010 for=0to9:form=0to5:i=ltchrd(.)*len(s$))
2020 s$=left$(s$,i)+chr$(ord(s$,i)+5)+mid$(s$,i+1)
2030 s$=left$(s$,i)+chr$(ord(s$,i)-5)+mid$(s$,i+1)
2040 next:next return
4000 Pokeic.: Pokese.: Pokesi=12.3
4010 lv=lv+1:s=10.c4$="Data ":for=150
4020 s$=.:for=0to5:for=0to9:c$=mid$(s$,i+1)
4040 s$=mid$(s$,i+1)+c$:i=i+1:next:next
4050 s$=s$+l:Printleft$(s$+l,c5+c3*o)tab(c5+c3*o)"  ":gosub300
4051 rem                                                  : sP cd 2c1 2sP 9rax3
4060 Printvt$+"[2;4H[2;4H"a$="H"+s$+s$+"P"
4061 rem                    : tl  : cl     : hm
4070 gosub5000:if4d=0thenrdn. ax=100:c4$="Bonus ":ff=160
4080 rem                    : t.5P hm
4200 Pokese.:Print"[2;4H[2;4H"$pc(213):t$ Printtab(13)"[2;4H[2;4H"
4201 rem                    : t clr 2cd
4210 Printtab(14)"[2;4H[2;4H"Completed"int((4d-45*(4s>10))/60*100)"[2;4H[2;4H"
4211 rem                    :lt.red                                    :tcl
4220 Printtab(13)"[2;4H[2;4H"                    ":gosub800:ford=1to800 next
4221 rem                    : blu 15s/#
4230 Printtab(11)"[2;4H[2;4H"
4231 rem                    : 3cu blu 19s/#
4240 Printtab(12)"[2;4H[2;4H"How tru level "lv+1
4241 rem                    : 9rn
4250 Printtab(11)"[2;4H[2;4H"
4251 rem                    : blu 19s/#
4260 if=ethenifl:ethenonf=nf:l.exe.
4290 9oto10
5000 l=l+1:s$ Print"[2;4H[2;4H"t$.:if1thithenhi=l Printtab(20)"A"hi
5001 rem                    : hm 9rax3 5cr
5010 return                                                    : lt.red
6000 Print"[2;4H[2;4H"$pc(5)"tab(16)"A"hi$"hi
6001 rem                    : clr 9rax3
6010 Print"[2;4H[2;4H"$pc(172)t$ Printtab(10)"[2;4H[2;4H"
6011 rem                    : clr
6020 Printsp$(1)"[2;4H[2;4H"A M E   O V E R"Printtab(10)"[2;4H[2;4H"
6021 rem                    : 1.p1                                  : 2cd blu 19s/#
6030 Printtab(5)"[2;4H[2;4H"Press the fire button to Play
6031 rem                    : 2cd 9rn                                   : blu 19s/#
6040 Printsp$ Printtab(6)"or return for instructions.
6050 Pokes1=24.: Pokeic.:
6060 if=ek(197)=ethengosub9000 Print"[2;4H[2;4H"  ":9oto6030
6061 rem                                                    : hm 6cd
6070 if=ek(.)*and16then6060
6080 9oto1
9000 Pokes3200.0:Pokes3201.0:Pokei98.0
9010 t$="[2;4H[2;4H[2;4H
```

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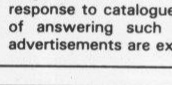

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SINCLAIR USER, JAN. 85 (ABOUT RELEASE 1.8): "HAS ESTABLISHED ITSELF AS THE STANDARD EXTENDED BASIC FOR THE SPECTRUM...TURNS SINCLAIR BASIC FROM A GOOD VERSION OF THE LANGUAGE TO A FANTASTIC ONE." NOW, WITH RELEASE 3.0, BETA BASIC BECOMES PROBABLY THE MOST POWERFUL BASIC AVAILABLE ON ANY 8-BIT MICRO!

- PROCEDURES - a terrific implementation that lets you extend your Basic! No PROC keyword is needed; e.g. you can use commands like: swop a,b or draw_box 10,20,5 or addup b( ),num. With parameter passing by value or by reference (including arrays), LOCAL variables and recursion.
- Up to 128 WINDOWS with their own attributes and character size.
- ANY CHARACTER SIZE (giving from 1 to 64 or more chars/line!).
- LISTINGS with optional automatic indentation of loops, procedures, IF, etc. Works on existing Spectrum Basic programs too!
- KEYWORDS (including the Spectrum Basic ones) can all be entered by typing them in full, or by the "single entry" method, or both in the same line.
- A full range of TOOLKIT commands. • EXCEPTIONAL ARRAY and STRING handling.
- Many powerful GRAPHICS commands. • EXCELLENT EDITOR - fast an d convenient.
- MICRODRIVE commands are improved and much easier to use.
- OTHER FEATURES, new or improved, are too many to fully list! DO - LOOP structure with WHILE, UNTIL and EXIT IF; ALTER, AUTO, BREAK, CLEAR, CLOCK, CONTROL CODES, DEF KEY, DPOKE, DRAW TO, EDIT, ELSE , FILL, GET, JOIN, KEYIN, multi-LET, LIST a slicer, LIST DATA, ON, ON ERROR, OVER 2, POKE strings, POP, READ LINE, REF, ROLL, SCROLL, SPLIT, TRACE, USING. Faster GOTOs, GOSUBs and FOR-NEXT loops.
- 26 POWERFUL FUNCTIONS: AND, OR, XOR, DEC, HEX$, BIN$; fast SINE, COSE, RND$; CHAR$, NUMBER, DPEEK, EOF, FILLED, INARRAY, INSTRING, ITEM, LENGTH, MEMORY$, MEM, MOD, SCRN$, SHIFT$, STRING$, TIME$, USING$.
- Spectrum Basic compatible - you can run existing programs. Transferable to Microdrive, Wafadrive and other special versions available.
- Comprehensive A5-size manual. More than 80 pages, packed with examples.
- To show you the power of Beta Basic's excellent procedures, we include on each tape a FREE TURTLE GRAPHICS package!
- Upgrades to Release 1.8 customers: If you bought direct from us, there is no need to return your cassette - just quote the (approximate) original purchase date with your order; otherwise return your cassette and name your supplier. The upgrade price of £6.95 (£7.50 overseas) includes a new manual. Release 1.8 remains available, at a reduced price of £8.95 (£8.50 overseas).
- TRANSFORM your Spectrum with BETA BASIC 3.0 for just £14.95 inclusive! (£15.50 overseas). Or if you want to know more about the program, send us an S.A.E.

(TICK AS APPROPRIATE.) PLEASE SEND ME:
[ ] BETA BASIC 3.0. PAYMENT OF £14.95 (OR £15.50 OVERSEAS) IS ENCLOSED.
[ ] BETA BASIC 3.0 UPGRADE. PAYMENT OF £6.95 (£7.50) IS ENCLOSED.
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[ ] MORE INFORMATION ON ..... I HAVE/DO NOT HAVE RELEASE 1.8 ALREADY.
A STAMPED ADDRESSED ENVELOPE IS ENCLOSED.

BETA SOFT
92 OXFORD RD.
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CHARLIE CHAN VISITS THE WOK FACTORY

Brian Lewis with an oriental orgy of violence on the BBC.

IMAGINE THE situation, there you are with your hot steaming rice in lotus leaf ready to tuck into your favourite meal of the day when you realise that there are no woks to cook your repas in and what's more, number one son is no where in sight so it looks like you'll have to get those woks yourself.

Untold nasties lurking

The only way you can get a wok at such short notice is to go to the old wok factory once owned by Mr Woo. However, this is not as easy as it seems because there are untold nasties lurking in the shadows of each of the factory's rooms. In all there are 15 screens and 15 woks to collect, but if you find any screen too hard simply press the Return key and you will go onto the next screen. Of course, you will gain no points for your efforts if you do this.

There are five different nasties — listed in the instructions — all of which are animated and all of which you have to avoid because the slightest touch can kill, and you can also die from falling too far.

Each of the listings should be typed in and checked and then saved one after the other on the same tape, but make sure you have a copy of listings 2 and 3 before you run them as they contain machine code and a mistake could cause a bad program ruining all your hard work typing in the game. If the listings appear quite long remember that the game has to store data for 15 screens which, even after massive compressing, is still quite lengthy.

As with all such games the controls are a simple left, right and jump type which may take a small amount of time to get used to because the longer a directional key is pressed the farther the jump goes in the appointed direction. This technique must be mastered to clear certain sheets.

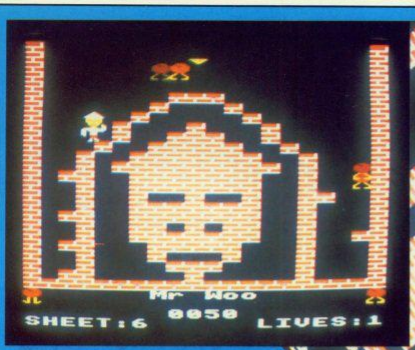
If BBC users wish to type in and play Charlie Chan Visits the Wok Factory they merely have to increase the values of the X and Y registers in line 320 of the second listing, their exact value will have to be found through experiment. I would like to apologise here and now for the sequence that occurs after all the lives are lost.

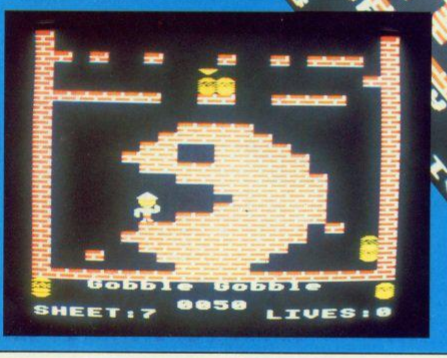
Listing 2.

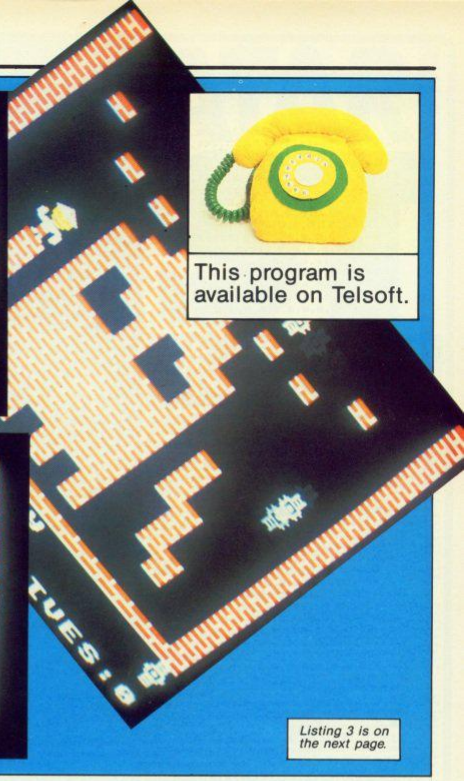
```
10ENVELOPE11,1,2,1,2,1,1,0,126,0,0,-126,126,126
20DATA40,20,40,10,40,10,52,10,48,10,48,10,48,20,32,
10,20,40
30DATA88,10,88,20,88,20,88,10,88,10,100,10,96,10,88
,10,96,20,88,10,68,30
40DATA40,20,40,10,40,10,52,10,48,10,40,10,48,20,32,
10,20,40,88,10,88,20,88,20,88,10,88,10,100,10,96,10,88
,10,96,20,88,10,68,30
50DATA52,40,48,40,40,15,32,20,32,10,52,40,46,40,40,
15,32,40
60DATA1,0,11,255,40,0,15,0
70RESTORE20:FORT=0TO97:READD:T?&4000=D:NEXT
80RESTORE60:FORT=0TO7:READD:T?&4062=D:NEXT
90?&950=20:?&951=0
100FORT=0TO25TEP2:P%=&486A:[OPTT
110DEC&950:LDA&950:BNEnosound:.a LDA&21:LDX#5:JSR&FF
F4
120INC&951:INC&951:LDX&951:LDA&4000,X:STA&406A:LDA&4
001,X:STA&950:LDA&7:LDX#&2:LDY#&40:JSR&FFF1:LDA&951:C
MP#96:BEQend
130.nosound RTS
140.end LDA#254:STA&951:JMPa
150]
160NEXT
170CHAIN""
```

Listing 1.

```
1MODE4
2REM IMPORTANT:: CHECK BEFORE RUNNING !
10VDU23,128,254,254,254,0,239,239,239,0,23,129,0,0,
0,0,255,126,60,24
20VDU23,130,60,94,239,255,255,255,126,60,23,131,36,
36,36,165,102,0,0,0
30VDU23,132,60,126,255,0,72,149,106,165,23,133,0,12
6,255,126,0,255,126,60
40VDU23,134,36,60,36,60,36,60,36,126,195,90,23,135,90,195
,126,36,60,36,60,36
50VDU23,136,255,129,145,185,147,133,181,181,23,137,
181,181,133,147,185,145,129,255
60VDU23,138,16,56,124,120,124,120,124,120,23,139,12
4,60,24,126,255,255,66,231
70VDU23,145,60,94,239,255,255,255,126,60,23,146,36,
66,129,129,231,0,0,0
80VDU23,147,0,0,0,60,126,255,72,149,23,148,106,165,
126,255,126,255,126,60
90VDU23,149,60,36,60,36,60,126,66,219,23,150,219,66
,126,60,36,60,36,60
100VDU23,151,255,129,169,145,171,133,181,181,23,152,
181,181,133,171,145,169,129,255
110VDU23,153,4,14,31,30,31,30,31,30,23,154,31,15,6,1
26,255,255,231,0
120ENVELOPE1,1,1,-5,2,10,1,10,126,0,0,-126,126,126
130ENVELOPE2,1,20,30,100,1,2,1,126,0,0,-126,126,126
140DATA0,0,0,0,17,0,0,0,0,17,51,119,255,255,240,176,20
8,0,136,204,238,255,224,160,96,0,0,0,0,0,0,0,0,0,0,0,0
,0,17,51,51,240,112,64,48,17,255,255,119,224,192,80,14
5,17,221,255,255,0,0,0,136,136,136,136,0,51,51,51,16,0
,0,0,0,51,51,3,3,3,35,34,102
150DATA136,136,8,8,8,136,204,0,0,0,0,0,0,0,0,0
160DATA0,0,0,0,0,0,0,0,0,17,51,119,255,112,80,96,136
,204,238,255,255,240,208,176,0,0,0,0,136,0,0,0,0,0,16,
51,51,51,51,17,112,48,32,16,17,119,255,255,240,224,32,
192,0,255,255,221,0,0,0,0,0,0,136,136,0,0,0,0,0,0,0,0,
51,51,3,3,3,35,102,0,153,153
170DATA25,24,8,136,136,204,136,136,136,0,0,0,0,0
180DATA&11,0,1,0,2,0,5,0,&11,0,2,0,9,0,1,0
190DJ%=&5200
200RESTORE140:FORT%=0TO207:READD:T%?DJ%=D:NEXT:sou=J%
+192:sOu2=sou+8:MX=sOu2+8:FORT=0TO25TEP2:P%=MX:[OPTT
210LDA#&90:STA&70:LDA#&73:STA&71:LDA#0:STA&72:STA&76
:STA&77:STA&79:STA&7C:STA&9C:LDA#2:STA&73:LDA#JX MOD25
6:STA&74:LDA#JX DIV256:STA&75:LDA#&00:STA&9D:LDA#&7B:S
TA&9E
220JSRdis:.start LDA&7C:CMP#4:BMIjl:JMPnoleft:.jl
230JSRCHr:CPX#&FF:BEOnoright:LDA#&B1:LDX#&BD:LDY#&F
F:JSR&FFF4:CPY#&FF:BNEnoright:JSRdis:CLC:LDA&70:ADC#8:
STA&70:LDA&71:ADC#00:STA&71:INC&72:JSRani:JSRdis:JSR50U
2
240.noright JSRchLE:CPX#&FF:BEOnoleft:LDA#&B1:LDX#&9
E:LDY#&FF:JSR&FFF4:CPY#&FF:BNEnoleft:JSRdis:SEC:LDA&70
:SBC#8:STA&70:LDA&71:SBC#0:STA&71:DEC&72:JSRani:JSRdis
:JSR50U2
250.noleft JSRcheck:CPX#&FF:BEOnojump:LDA&77:CMP#1:B
EOnojump:LDA#&B1:LDX#&FF:LDY#&FF:JSR&FFF4:CPY#&FF:BNEn
ojump:JSRjump
260.nojump LDA&77:CMP#0:BEOnS:JSRJUMP
270.nS LDA#&B1:LDY#&FF:LDX#&B6:JSR&FFF4:CPY#&FF:BNEH
S:RTS:.HS JSRcheck:CPX#&FF:BNEe1:JSRHOLE
280.e1 LDA&72:CMP#34:BNEg1:JSRscore:JSRscore:JSRscor
e:JSRscore:RTS:.g1 LDA&7C:CMP#&FF:BNEh1:LDA#10:STA&79:
RTS:.h1 LDX#0:JSRenemy:CPX#&FF:BNEuUJ2:STX&79:RTS:.uU2
JSRdelay:JMPstart
290.dis LDY#0:.A LDA(&70),Y:EOR(&74),Y:STA(&70),Y:IN
Y:CPY#32:BNEA:CLC:LDA&70:ADC#&20:STA&4D:LDA&71:ADC#1:S
TA&4E:.B LDA(&4D),Y:EOR(&74),Y:STA(&4D),Y:INY:CPY#64:B
NEB:CLC:LDA&4D:ADC#&20:STA&4D:LDA&4E:ADC#1:STA&4E:.C L
DA(&4D),Y:EOR(&74),Y
300STA(&4D),Y:INY:CPY#96:BNEC:RTS
310.ani LDA&76:CMP#1:BEOsc:CLC:LDA&74:ADC#96:STA&74:
LDA&75:ADC#0:STA&75:LDA#1:STA&76:RTS:.sc SEC:LDA&74:SB
C#96:STA&74:LDA&75:SBC#0:STA&75:LDA#0:STA&76:RTS
320.delay LDX#100:.D LDY#150:.E DEY:BNEE:DEX:BNED:RT
S
```







Listing 3 is on the next page.

```
330.check LDX#0:LDA&77:CMP#1:BEQF:CLC:LDA&70:ADC#&C0
:STA&4D:LDA&71:ADC#3:STA&4E:LDY#0:.E LDA(&4D),Y:AND#15
:BEOH:INX:.H INY:CPY#24:BNEE:CPX#0:BEQdrop:.F LDX#0:LD
A&7C:CMP#0:BMIi1:LDA#&FF:STA&7C:RTS:.i1 STX&7C:RTS
340.drop INC&7C:DEC&73:JSRdis:JSRani:CLC:LDA&70:ADC#
&40:STA&70:LDA&71:ADC#1:STA&71:JSRdis:LDX#&FF:RTS
350.jump LDA#1:STA&77:LDA#0:STA&78:JMPSOU
360.JUMP LDA&73:CMP#23:BPLend:INC&78:LDA&78:CMP#5:BP
Ldown:INC&73
370JSRdis:SEC:LDA&70:SBC#&40:STA&70:LDA&71:SBC#1:STA
&71:JMPdis
380.down LDA&78:CMP#6:BEQend:RTS:.end LDA#0:STA&77:R
TS
390.SOU LDA&953:CMP#&FF:BEQzZ2:LDA#7:LDX#sOu2 MOD256:
LDY#sou DIV 256:JSR&FFF1:.zZ2 RTS
400.CHri CLC:LDA&70:ADC#32:STA&4D:LDA&71:ADC#0:STA&4
E:LDY#0:.a1 LDA(&4D),Y:AND#15:BNEhit:INY:CPY#8:BNEa1:L
DX#0:RTS:.hit LDX#&FF:RTS
410.chLE SEC:LDA&70:SBC#8:STA&4D:LDA&71:SBC#0:STA&4E
:LDY#0:.b1 LDA(&4D),Y:AND#15:BNEhit:INY:CPY#8:BNEb1:LD
X#0:RTS
420.SOU2 LDA&953:CMP#&FF:BEQzZ2:LDA#7:LDX#sOu2 MOD25
6:LDY#sOu2 DIV 256:JMP&FFF1
430.check LDA&70:STA&4D:LDA&71:STA&4E:LDY#0:.c1 LDA(
&70),Y:EOR(&74),Y:BNEsee2:.d1 INY:CPY#24:BNEc1:LDX#0:R
TS
440.see2 AND#15:BNEd1:LDX#&FF:RTS
450.HOLE LDY#21:.f1 LDA#31:JSR&FFEE:LDA#19:JSR&FFEE:
TYA:JSR&FFEE:LDA#32:JSR&FFEE:INY:CPY#25:BNEf1:JSRdis:L
DA#31:JSR&FFEE:LDA&7B:JSR&FFEE:LDA&7D:JSR&FFEE:LDA#32:
JSR&FFEE:JSRdis:JMPscore
460.enemy LDY#0:.k1 LDA&D60,Y:STA&A60,Y:INY:CPY#7:BN
Ek1:JSRENE:JSRDIS2:LDY#0:.l1 LDA&A60,Y:STA&D60,Y:INY:C
PY#7:BNEl1
470LDY#0:.m1 LDA&D70,Y:STA&A60,Y:INY:CPY#7:BNEm1:JSR
ENE:JSRDIS2:LDY#0:.n1 LDA&A60,Y:STA&D70,Y:INY:CPY#7:BN
En1:RTS
480.ENE JSRread
490LDY#0:TYA:.s1 STA(&4D),Y:INY:CPY#16:BNEs1:CLC:LDA
&4D:ADC#&40:STA&4D:LDA&4E:ADC#1:STA&4E:.t1 LDY#0:TYA:.
u1 STA(&4D),Y:INY:CPY#16:BNEu1
500LDA&A66:CMP#1:BEQlef:CMP#2:BEQrig:CMP#4:BEQup:CMP
#0:BEQdow:RTS
510.lef DEC&A60:LDA&A60:CMP&A64:BEQrev:RTS:.rig INC&
A60:LDA&A60:CMP&A62:BEQrev:RTS:.up DEC&A61:LDA&A61:CMP
&A65:BEQrev:RTS:.dow INC&A61:LDA&A61:CMP&A63:BEQrev:RT
S
520.rev LDA&A66:CMP#1:BEQLEF:CMP#2:BEQRIG:CMP#4:BEQU
P:CMP#0:BEQDOW:.LEF LDA#2:JMPDO:.RIG LDA#1:JMPDO:.UP L
DA#8:JMPDO:.DOW LDA#4:.DO STA&A66:RTS
530.read LDA#0:STA&4D:LDA#&58:STA&4E:LDY&A60:.o1 CPY
#0:BEQp1:CLC:LDA&4D:ADC#16:STA&4D:LDA&4E:ADC#0:STA&4E:
DEY:JMPo1:.p1 LDY&A61:.q1 CPY#0:BEQr1:CLC:LDA&4D:ADC#&
40:STA&4D:LDA&4E:ADC#1:STA&4E:DEY:JMPq1:.r1 RTS
540.HIT LDX#&FF:RTS
550.DIS2 JSRread:LDY#0:.aa1 LDA(&4D),Y:BNEHIT:INY:CP
Y#16:BNEaa1:CLC:LDA&4D:ADC#&40:STA&4D:LDA&4E:ADC#1:STA
&4E:LDY#0:.bb1 LDA(&4D),Y:BNEHIT:INY:CPY#16:BNEbb1
560SEC:LDA&4D:SBC#&40:STA&4D:LDA&4E:SBC#1:STA&4E:LDY
#0:.cc1 LDA(&9D),Y:STA(&4D),Y:INY:CPY#16:BNEcc1:CLC:LD
A&4D:ADC#&40:STA&4D::LDA&4E:ADC#1:STA&4E:CLC:LDA&9D:AD
C#&40:STA&9D:LDA&9E:ADC#1:STA&9E:.LDY#0:.dd1 LDA(&9D),
Y:STA(&4D),Y:INY:CPY#16
570BNEdd1:SEC:LDA&9D:SBC#&40:STA&9D:LDA&9E:SBC#1:STA
&9E:INC&9C:LDA&9C:CMP#10:BNEx1:LDA#0:STA&9C:LDA&9D:CMP
#&B0:BEQy1:LDA#&B0:STA&9D:LDA#&79:STA&9E:RTS:.y1 LDA#&
B0:STA&9D:LDA#&78:STA&9E:.x1 RTS
571.score INC&B1:LDA&B1:CMP#10:BNEshow:LDA#0:STA&B1:
INC&B2:LDA&B2:CMP#10:BNEshow:LDA#0:STA&B2:INC&B3:LDA&B
3:CMP#10:BNEshow:LDA#0:STA&B3:INC&B4:LDA&B4:CMP#10:BNE
show:LDA#0:STA&B4:INC&B5
572.show LDA#31:JSR&FFEE:LDA#0:JSR&FFEE:LDA#28:JSR&F
FEE:LDY#3:.zz2 CLC:LDA&B0,Y:ADC#48:JSR&FFEE:DEY:CPY#&F
F:BNEzz2:RTS
580:NEXT
581PRINTTAB(0,15);"Well you'll just have to do witho
ut the          title page won't you"
590PRINT`''''''''':CHAIN""
```

(continued from previous page)

Listing 3.

```
1VDU23,142,84,84,131,128,128,135,136,240,23,143;0,
0,128,126,1,1,129,126,23,144,84,84,84,84,84,84,84
2ENVELOPE7,1,1,-1,-1,2,1,126,0,0,-126,126,126
10DATA192,0,240,0,48,0,0,0,0,0,0,0,2,192,0,48,0,12,0,
19,143,192,0,0,0,0,76,0,3,64,0,192,1,48,124,0,0,0,0,4,
200,0,48,0,76,0,3,0,0,209,1,52,64,13,16
20DATA0,0,0,0,0,0,0,0,0,63,255,192,0,0,0,0,0,0,1,0,0,
63,255,192,0,0,0,0,128,0,0,0,3,255,252,0,0,0,0,0,0,16,
0,3,255,252,0,0,0,0,8,0,0,0,0
30DATA0,0,0,0,0,0,0,0,255,255,0,0,64,0,0,0,0,0,0,0,122,
35,76,0,0,0,0,0,0,218,0,0,64,0,11,176,0,0,0,0,0,0,16,0
,0,46,250,16,0,8,0,0,0,0,0,0
40DATA0,0,0,0,0,0,0,3,0,0,28,62,0,0,0,0,0,0,4,0,0,0,0,0
,0,127,12,64,64,16,16,12,6,1,1,0,96,64,48,20,4,4,1,65,
32,192,64,16,17,4,132,1,1,1,66,64
50DATA0,0,0,0,0,0,0,0,0,0,29,238,192,0,0,0,4,0,0,0,0,0,
55,123,128,0,2,0,0,0,0,0,0,0,13,222,224,0,0,0,0,0,0,0,16,0
,0,238,236,18,162,4,228,193,40,160,202,236
60DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,112,0,34,0,16,64,0,13
6,2,114,1,62,64,159,200,47,250,25,252,130,127,32,146,7
6,39,242,25,252,130,107,32,159,201,99,226,8,136,130,28
,33,130,8
70DATA0,0,0,0,0,0,68,184,0,0,0,0,64,0,15,204,240,0,0
,0,0,0,0,120,0,63,0,25,224,14,124,1,255,0,31,224,1,248,0
,62,0,31,128,31,224,31,224,31,244,15,252,1,254,2,63,0,7,128
80DATA0,0,0,0,0,0,0,0,0,0,64,1,0,0,1,73,64,7,0,3,224,
1,248,0,127,0,22,192,4,144,1,36,1,127,64,95,200,23,244
,13,253,130,127,32,159,200,39,243,17,84,68,85,0,0,0
90DATA0,0,0,0,0,0,0,0,128,10,32,7,248,0,170,0,2,128
,0,128,7,255,1,132,64,80,144,18,20,4,67,129,8,64,97,16
,20,39,4,133,1,16,192,66,16,31,252,193,4,0,65,0,56,224

100DATA0,0,0,0,4,0,0,0,0,0,128,0,45,128,0,0,0,10,0,0
,0,0,13,202,104,0,0,0,0,0,0,16,0,0,255,252,31,254,3,25
5,0,127,128,15,195,195,240,0,0,2,0,0,0,0
110DATA0,16,0,4,0,1,0,192,64,0,16,0,4,0,1,0,224,64,6
,16,0,4,0,1,2,3,64,0,16,0,4,1,153,0,0,0,192,0,0,0,0,0,
0,0,0,57,254,0,0,127,128,31,224,7,248
120DATA0,0,0,0,0,0,0,0,0,0,0,0,0,63,192,0,3,128,0,128,0,
32,32,8,0,2,112,255,128,0,32,64,8,0,2,0,1,134,0,32,0,9
,143,242,0,0,128,0,32,0,14,8,2,0,0,128
130DATA0,0,0,0,0,0,0,0,0,0,63,255,192,0,0,0,0,0,0,0,224,
0,64,0,16,0,0,0,0,3,254,0,0,0,0,0,64,0,0,0,0,0,4,0,32,
128,16,16,8,4,2,0,129,0,63,192
140DATA127,255,159,255,231,255,248,255,252,31,254,3,
255,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,63,255,144,0,0,0,1
,0,0,0,0,0,0,0,255,255,0,0,8,0,0,0,0,0,0
150DATA0,0,29,221,133,84,65,84,152,85,20,21,221,128,
0,0,0,1,0,0,192,0,240,0,124,0,63,0,31,192,15,240,7,252
,3,255,3,255,193,255,240,255,156,127,195,0,0,16,0,0,0,
0,0,0
160DATAEntrance,The Steps',Mess,The Safe,His Name,Mr
Woo,Gobble Gobble,Ghosty,Sales Rooms,THE GREAT WOCK,D
ivide,Blob,Empty Wock,The Press,ROUISE
170DATA&11,0,1,0,10,0,10,0
180DATA&11,0,2,0,2,0,2,1,0
190MODE4:DIMA$(15):RESTORE160:FORTX=1TO15:READA$(TX)
:NEXT:CLS:PRINT'''SPC(2);"WOULD YOU LIKE INSTRUCTIONS
(Y/N)?"
191A$=GET$:IF A$<>"Y" AND A$<>"N" THEN 191 ELSE IF A
$="Y" THEN 620
200DEFPROCWALL:COLOUR131:COLOUR1:FORTX=1TO24:PRINTTA
B(0,TX):CHR$128:TAB(19,TX);CHR$128:NEXT:PRINTTAB(0,TX
);STRING$(20,CHR$128)::ENDPROC
210FORT=0TO5:T?&B0=0:NEXT:A=0:lives%=3:?&79=A:MODE5:
VDU23,1,0;0;0;0;
230*FX15,1
240PROCWALL:COLOUR128:COLOUR3:PRINTTAB(0,30)"PRESS S
PACE TO START";
250A$=GET$:IF A$<>" " THEN 250
251?&953=0:PRINTTAB(2,26)"KRAFTWERK (Y/N)?":A$=GET$:
IF A$<>"N" AND A$<>"Y" THEN 251 ELSE IF A$="N" THEN 25
4
252?&953=&FF:?&950=20:?&951=0:?&220=&6A:?&221=&40:SO
UND1,-15,40,15
253*FX14,4
254PRINTTAB(2,26):SPC(16)
260PRINTTAB(0,30);SPC(20)::COLOUR1:COLOUR131:PROCREA
S
270PROCEN:COLOURE:PRINTTAB(0,26):CHR$(AS)TAB(19,26):
CHR$(AS+15):COLOURF:PRINTTAB(0,27):CHR$(BS)TAB(19,27):
CHR$(BS+15);
280B=(A/10)+COLOUR128:COLOUR3:PRINTTAB(0,29);"SHEET:
";B:TAB((20-(LENA$(B)))/2,26);A$(B);TAB(13,29);"LIVES:
";lives%
300B=430+A:RESTOREB:FORT=0TO6:READD:T?&D60=D:NEXT:FO
RT=0TO6:READD:T?&D70=D:NEXT
310COLOUR128:CALLMX:PRINTTAB(0,26);SPC(20)TAB(0,27):
SPC(20)
320IF ?&79>8 THEN PROCDEAD
330IF lives%=-1 THEN 370
340COLOUR131:COLOUR1:FORTX=21TO24:PRINTTAB(19,TX):CH
R$128:NEXT:VDU28,1,24,18,1,17,128:FORTX=1TO25:PRINTTA
B(0,0):CHR$11::NEXT:VDU26
341GOTO260
350DEFPROCDEAD:FORT=0TO200STEP10:FORG=0TO50:NEXT:VDU
19,0,1;0;:FORG=0TO50:NEXT:VDU19,0,0;0;:SOUND&11,1,255-
T,5:NEXT
360lives%=lives%-1:ENDPROC
370*FX15,1
371*FX13,4
372*FX21,5
379PROCRIPOFF
380GOTO210
390DEFPROCREAS:IF ?&79<6 A=A+10:IF A=160 A=10
400RESTOREA:X%=1:Y%=1:FORTX=0TO53:AX=128:READD:FORH%
=0TO7:IF (D AND AX)=AX THEN PRINTTAB(X%,Y%):CHR$128:
410X%=X%+1:IF X%=19 X%=1:Y%=Y%+1
420AX=(AX/2):NEXT,:B=(A/10):COLOUR2:COLOUR128:RESTOR
E430:FORT=1TOB:READX,Y:NEXT:PRINTTAB(X,Y):CHR$129:?&7B
=X:?&7D=Y:ENDPROC
430DATA8,3,4,1,4,1,10,22,6,1,9,2,9,4,9,3,15,11,1,7,3
,1,2,2,3,1,1,10,18,4
440DATA1,10,17,10,2,10,2,10,16,17,16,2,16,2
450DATA5,6,17,6,4,6,2,1,16,14,16,2,16,2
460DATA6,5,6,21,6,6,8,10,10,10,21,10,6,8
470DATA11,15,11,22,11,15,8,10,12,18,22,18,13,8
480DATA6,8,16,8,7,8,2,10,17,16,17,3,17,2
490DATA1,3,17,3,2,3,2,18,5,18,17,18,6,8
500DATA1,5,16,5,2,5,2,18,9,18,22,18,10,8
510DATA4,4,14,4,4,4,2,17,10,17,22,17,11,8
520DATA2,10,2,22,2,11,8,18,10,18,18,18,11,8
530DATA3,8,13,8,4,8,2,1,13,15,13,2,13,2
540DATA13,15,13,19,13,13,8,18,12,18,22,18,13,8
550DATA1,14,10,14,1,14,2,2,9,10,9,2,9,2
560DATA11,10,14,10,2,10,2,9,14,9,22,9,15,8
570DATA1,11,14,11,2,11,2,3,15,14,15,4,15,2
580DATA7,7,7,15,7,8,8,4,23,16,23,5,23,2
590DEFPROCEN:B=(A/10):IF (B MOD 5)=1 E=1:F=2:AS=130:
BS=131 ELSE IF (B MOD 5)=2 E=2:F=2:AS=132:BS=133 ELSE
IF (B MOD 5)=3 E=3:F=3:AS=134:BS=135 ELSE IF (B MOD 5)
=4 E=3:F=3:AS=136:BS=137
600IF (B MOD 5)=0 E=1:F=1:AS=138:BS=139
610ENDPROC
620MODE4:VDU23,1,0;0;0;0;:A$="CHARLIE CHAN":B$="VISI
TS":C$="THE WOCK FACTORY":DIMB$(5):RESTORE790:FORT=1TO
5:B$(T)=".........":READG$:B$(T)=B$(T)+G$:NEXT
630FORTX=1TOLENA$:G=ASC(MID$(A$,TX,1)):PROCDBL(G):PR
INTTAB(TX+13,0);CHR$140TAB(TX+13,11):CHR$141:NEXT
640FORTX=1TOLENB$:G=ASC(MID$(B$,TX,1)):PROCDBL(G):PR
INTTAB(TX+16,13);CHR$140TAB(TX+16,14):CHR$141:NEXT
650FORTX=1TOLENC$:G=ASC(MID$(C$,TX,1)):PROCDBL(G):PR
INTTAB(TX+11,16);CHR$140TAB(TX+11,17):CHR$141:NEXT
660VDU19,0,1;0;:FORG=0TO500:NEXT:VDU19,1,0;0;:FORTX=
0TO6:PRINTTAB(19,31):SOUND&11,2,TX*25,4:FORG=0TO30:NEX
T,:PRINTTAB(0,10):STG1NG$(40," ")
670PRINTTAB(12,13):"Do Battle With:-"
680PRINTTAB(1,15):CHR$130TAB(1,16):CHR$131TAB(1,18);
CHR$132TAB(1,19)CHR$133TAB(1,21):CHR$134TAB(1,22):CHR$
135TAB(1,24):CHR$136TAB(1,25):CHR$137TAB(1,27):CHR$138
TAB(1,28):CHR$139
690DGX=1:FORTX=16TO28STEP3:FORGX=1TOLENB$(GGX):PRINT
TAB(GX+3,TX):MID$(B$(GGX),GX,1);:PROCsound:FORG=0TO60:
NEXT,:GGX=GGX+1:FORG=0TO100:NEXT,
700FORG=0TO5000:NEXT:VDU17,129,28,0,31,39,11,12,26,1
7,0
710PRINTTAB(0,12);"You (Charlie Chan) must go around
the deserted wock factorying to collect somewocks t
o cook your tea with.However the prementioned nasties
hinder you progresses much as they can."
720PRINT'''"On each of the 15 screens there will be a
wock to collect and the exit will not be opened until
you have collected it. You have three lives and loos
e one if you drop too far or get hit."
730PRINT'''"THE KEYS ARE:-"'"Z - LEFT
X - RIGHT"
740PRINT" shift - JUMP"
750FORG=0TO15000:NEXT:VDU19,0,0;0;19,1,6;0;:PRINTTAB
(4,30);"BE VELY PLEASED IF HONORABLE SIR";TAB(12,31);"
PLESS SPACE BAR!";
760A$=GET$;IF A$<>" " THEN 760
770CLS:GOTO210
780DEFPROCDBL(G):?&70=G:AX=10:XX=&70:YX=0:CALL&FFF1:
VDU23,140,?&71,?&71,?&72,?&72,?&73,?&73,?&74,?&74,23,1
41,?&75,?&75,?&76,?&76,?&77,?&77,?&78,?&78:ENDPROC
790DATACONAN THE BALL BEARING,Hammy Burger,WALLY WAT
CH,Henry Head Cleaner,KEVIN QUICKSHOT
800DEFPROCRIPOFF:FORT=1TO3:VDU19,T,0;0;:NEXT:CLS:COL
OUR1:FORTX=20TO30:PRINTTAB(8,TX):CHR$128;CHR$
128:CHR$128:CHR$128:NEXT
810FORTX=0TO2:FORGX=0TO31:GX?(&6DD0+(TX*320))=GX?(JX
+(32*TX)):NEXT,
820COLOUR128:COLOUR3:A$=" "+CHR$144+" "+CHR$8+CHR$8+
CHR$8+CHR$10+" "+CHR$142+CHR$143+" "
821VDU19,1,1;0;19,2,3;0;19,3,7;0;
830FORTX=0TO18:PRINTTAB(8,TX);A$;
840SOUND&11,7,255-(TX*14),2:FORG=0TO60:NEXT,
870FORG=0TO1000:NEXT:CLS:ENDPROC
999END
1020DEFPROCSOUND:SOUND&11,1,T*25,1:FORG=0TO50:NEXT:EN
DPROC
1000DEFPROCsound:SOUND&11,1,255,1:ENDPROC
```

ATARI 520ST

POWER WITHOUT THE PRICE

THE NEW ATARI 520ST

Under the new leadership of Jack Tramiel (former boss and founder of Commodore Business Machines), Atari Corporation have marked their entry into the world of business/personal computers with a machine which leaves the competition standing. Tramiel's slogan 'Power Without the Price' has been implemented in the manufacture of the new 512K Atari 520ST colour computer which offers the user amazingly high performance at an incredibly low price. Launched as a work-station, this new system incorporates seven software packages as well as the 520ST computer with 512K RAM, mouse controller, high resolution monochrome monitor (640x400), 95 key keyboard (with 18 key numeric keypad), MIDI interface, GEM and a 500K 3½ inch disk drive, all for the package price of only £851.30 (+VAT = £749). Dubbed the 'Mac beater' and the 'Jackintosh' (after Atari's Chief, Jack Tramiel), Atari's new machine has been directly compared with the Apple Macintosh RRP £2595 (+VAT = £2985) which offers similar features and capabilities but at a much higher price. Favourably reviewed by the UK's highly critical specialist computer press, the 520ST is likely to make a great impact in this country as a sophisticated alternative to an IBM PC, APRICOT or APPLE MACINTOSH. Unlike its overpriced competitors, the Atari 520ST can be linked up to a colour monitor to unleash a choice of up to 512 colours. The addition of colour brings out the full potential of graphics packages such as GEM.

USER FRIENDLY GEM OPERATING SYSTEM

The power of the ST is harnessed and made user friendly by the new operating system 'GEM' from Digital Research. GEM stands for Graphics Environment Manager and allows a user friendly colour or B/W graphics interface which closely resembles that of the Macintosh. This similarity extends to the use of moveable resizeable windows, icons to represent objects such as disks and disk drives, and the use of pull down menus and a mouse. The advantage of all this is that the computer becomes extremely easy to use. GEM has now been implemented for the Acorn, ACT, Atari, IBM, ICL, and Olivetti. Software written for GEM on one computer should also run under GEM on another computer. This will enable the market to quickly produce a large library of standard interchangeable software.

FREE SOFTWARE AND FUTURE EXPANSION

The Atari 520ST comes supplied with seven free software packages as listed below: 1) TOS - Tramiel Operating System based on CPM 68K. 2) GEM Graphics Environment Manager by Digital Research (DR) giving a WIMP (Window, Icon, Mouse, Pull down menu) environment. 3) DR GEM Paint for creating graphics masterpieces. 4) DR GEM Write for word processing. 5) Logo learning language to enable you to write your own programs easily using turtle graphics. 6) DR Personal Basic a powerful user friendly version of the Basic programming language. 7) BOS operating system giving you access to dozens of business applications packages already available on the market. Designed with future expansion in mind, the ST also features a host of different interfaces to the outside world and an impressive list of accessories is planned. Atari will soon be releasing a 1000K (1MB) 3½ inch disk drive, and a 15MB hard disk storage system as well as a mass storage compact disk (CD) player capable of storing an entire 20 volume encyclopedia on one disk. A full range of inexpensive printers are planned including dot matrix, daisywheel and thermal colour printers. With its unbeatable graphics, speed and software at a price which is far below that of any comparable personal computer currently on the market, the ST is all set to do battle with the competition. To receive further details of the ST from Silica Shop, just fill in the coupon below with your name and address details and post it to us.

Silica Shop Price: £851.30 + £97.70 VAT = £749.00 This price includes:

- ★ 512K RAM
- ★ B/W MONITOR
- ★ MOUSE
- ★ 500K 3.5" DISK DRIVE
- ★ GEM
- ★ KEYBOARD (95 KEYS)

ATARI 520ST SPECIFICATION

MEMORY
512K RAM (524,288 bytes)
192K ROM expandable to 320K
Port for extra 128K plug-in ROM cartridges
256K TOS operating system

GRAPHICS
Individually addressable 32K bit-mapped screen with 3 screen graphics modes:
- 320x200 pixels in 16 colours (low resolution)
- 640x200 pixels in 4 colours (med resolution)
- 640x400 pixels in monochrome (high res)

16 shades of grey in low res mode
512 colours available in low/medium res
8 levels of width in red, green and blue

ARCHITECTURE
8 custom designed chips:
- GLUE Chip - MMU Memory Mngmnt Unit
- DMA Controller - Graphics Processing Unit

16/32 bit Motorola 68000 processor at 8MHz
eight 32 bit data registers
eight 32 bit address registers
16 bit data bus/24 bit address bus
7 levels of interrupts/56 instructions
14 addressing modes/5 data types

DATA STORAGE
High speed hard disk interface
Direct memory access 1.33 Mbytes per second
CD (Compact Disc) interface
Built in cartridge port
Dedicated floppy disk controller

DISK DRIVE
500K (unformatted) sided 3½" floppy disk drive
(triple formatted) storage capacity

SOUND AND MUSIC
Sound Generator
Frequency range from 30 Hz to above audible
3 voices (channels) in wave/sound generator
addition to a noise generator
Separate frequency and volume controls
Dynamic envelope control
ADSR (Attack, Decay, Sustain, Release)
Noise generator
MIDI interface for external music synthesizers

KEYBOARD
Separate keyboard microprocessor
Standard QWERTY typewriter styling
Ergonomic angle and height
95 keys including 10 function keys
Numeric keypad — 18 keys including ENTER
One touch cursor control keypad

MONITOR
12" screen - high res monochrome monitor
640x400 monochrome resolution

Note: Some of the above specifications are pre-release and may therefore be subject to change

VIDEO PORTS
Display - Low Resolution - 40 columns
- Mid/High Res - 40/80 plus cols
- Medium res RGB (Red/Green/Blue) output
- High resolution monochrome (Black & White)

COMMUNICATIONS
Bidirectional centronics parallel interface for printers, or modems capable of input/output
RS232C serial modem/printer interface
1750 Terminal Emulation Software
Maximum Baud Rate up to 19,200
High speed hard disk interface
Floppy disk controller (Western Digital)
2 joystick ports (one for 2 button mouse)
MIDI interface for external music synthesizers

GEM WIMP ENVIRONMENT
WIMP - Window Icon Mouse Pop-down menus
Two button mouse controller
Icons/Pull down menus/Windows
GEM VDI - Virtual Device Interface
GEM AES - Application Environment Services
GEM GBT - Bit Block Transfer
Real time clock & calendar

SOFTWARE
GEM environment
with user friendly Macintosh style operation
TOS - Tramiel Operating System
Atari's own system based on CP/M 68K with hierarchical directory & file structure plus a host of MS DOS & UNIX command structures
BOS - Business Operating System
to run any standard BOS business programs
GEM Paint
with GEM PAINT graphics mgmt system
and GEM WRITE word processor
Personal BASIC and DR Logo
originally written by Digital Research (DR)
Very much like those on other machines
except for the extensive use of pull down menus, mouse control and windows

VARIOUS
Dimensions: 470mmx240mmx80mm
Replaceable external power supplies
Expansion port for upgrade to 500K/1,000K
- two drives can be connected:
- 3½" 15Mb hard disk
- CD (compact laser disc)
- Dot matrix & daisywheel printer (Black)
- Thermal dot matrix (colour)
- RGB & monochrome monitors

LANGUAGES
BASIC & LOGO supplied
Many others will soon be available, including Assembler, BCPL, C, Cobol, Compiled Basic, Lisp, Modula-2 and Pascal

MACINTOSH v Fie v 520ST

Imagine a Fiat Mac - the 512K Apple Macintosh - but with a bigger screen, a far bigger keyboard with numeric keypad, cursor and function keys, and colour. That gives you some idea of what the Atari 520ST is like, except for two important things. First the Atari seems faster. Second the Atari system is about one third of the price."

June 1985 - Jack Schofield - PRACTICAL COMPUTING

FEATURES OF BASIC SYSTEM	APPLE MACINTOSH	APRICOT	ATARI
Price includes B/W Monitor	YES	NO - extra £200	YES
Keyboard size mm (LxDxH)	330x147x50	450x167x28	470x240x60
Keyboard size inc. (LxDxH)	1.5x9.5x2	18.5x9.5x1	18.5x9.5x2.5
3½" D/Drive (Unformatted)	500K	500K	500K
3½" D/Drive (Formatted)	398K	315K	340K
WIMP (Window, Icon, Mouse)	Apple	ACT - Activity	GEM
Real-time Clock	YES	YES	YES
Polyphonic Sound Generator	YES	NO	YES
RS232 Serial Port	YES	YES	YES
Centronics Parallel Printer Port	NO	YES	YES
Dedicated Floppy Disk Controller	NO	YES	YES
Hard Disk DMA Interface	NO	YES	YES
Full stroke keyboard	YES	YES	YES
Number of keys on keyboard	59	82	95
Numeric Keypad	NO	YES (16 Keys)	YES (18 keys)
Cursor Control Keypad	NO	YES	YES
Function keys	NO	10	10
16-bit processor	68000	Intel 8086	68000
Processor running speed	8MHz	4.77MHz	8MHz
RAM size	512K	256K	512K
Number of graphics modes	1	4	3
Number of colours	Monochrome	8	512
Max Screen Resolution (pixels)	512 x 342	640 x 256	640 x 400
Mouse included	Single Button	NO - extra £85	Two Button
Replaceable External Power Pack	NO	NO	YES
Cartridge Socket	NO	NO	YES
Joystick Ports	NO	NO	YES (two)
MIDI Synthesiser Interface	NO	NO	YES
Monitor Size	9"	9" - extra £200	12"
RGB Video Output	NO	YES	YES
System Cost with: Mouse - Monochrome Monitor - 512K RAM - 500K Disk Drive			
Price of basic system (exc VAT)	£2595+VAT	£595+VAT	£602+VAT
+ Mouse	Included	£95+VAT	Included
+ Monochrome Monitor	Included	£200+VAT	Included
+ Expansion to 512K RAM	Included	£295+VAT	Included
Price of complete system (exc VAT)	£2595+VAT	£1195+VAT	£602+VAT
PRICE (rounded down including VAT	**£2,984**	**£1,362**	**£749**

PRESS COMMENT

"Atari's new corporate image as an aggressive low cost computer maker is likely to mirror that of Commodore where Mr. Tramiel established the maxim that 'Business is war'."

August 21st 1984 **FINANCIAL TIMES**

"This is the only personal computer I know of that comes with a Mod interface as standard."

Peter Bright March 1985 **PERSONAL COMPUTER WORLD**

"The (GEM) version running on the Atari 68000 machines will have the additional advantage of leaving the PC version standing."

April 6th 1985 **PERSONAL COMPUTER NEWS**

"It would seem that GEM offers the ideal operating system."

March 7th 1985 **POPULAR COMPUTING WEEKLY**

"I found it (GEM) extremely easy to use and was very impressed with the way in which it disguises the unfriendly hardware and operating systems lurking under the surface."

Peter Bright Feb 1985 **PERSONAL COMPUTER WORLD**

"The electronics in the machine are a work of art ... The heart of the 520ST is a Motorola 68000, one of the most powerful 16-bit processors around and in many respects it is close to being a 32-bit chip ... when the machine appears in the shops, I'll be at the front end of the queue to buy one."

Peter Bright June 1985 **PERSONAL COMPUTER WORLD**

"This machine is significantly more powerful than an IBM PC ... Atari looks to origin a sure-fire winning machine, this is a Jackintosh."

May 11th 1985 **PERSONAL COMPUTER NEWS**

"... the use of GEM makes the new range of Atari computers so similar to the Macintosh (with the added attraction of colour), that they are already being called 'Jackintoshes'."

May 2nd 1985 **COMPUTING**

"The new Atari ST computers truly represent to the consumer what Jack Tramiel is saying — easy-to-use computing power without the price."

March 1985 **ANALOG COMPUTING**

"It (the ST) uses the most modern technology that is affordable in a package that gives a professional impression."

May 23rd 1985 **POPULAR COMPUTING WEEKLY**

"The Atari ST is one of the most elegant designs I have seen. Atari has used an original and elegant method of memory management which should make the ST faster than any other PC on the market - in any price bracket ... The 64K dollar question is would I go out and spend money for one? To which the only answer is "Try and stop me!"

John Lambert July 1985 **ELECTRONICS & COMPUTING**

"The 520ST is technically excellent ... The 520ST hardware is the new standard by which others will be judged."

July 1985 **YOUR COMPUTER**

SILICA SHOP LTD, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX

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PLEASE SEND ME FREE LITERATURE
ON THE NEW ATARI 520ST COMPUTER

Mr/Mrs/Ms: Initials: Surname:

Address:

Postcode:

Do you already own a computer
If so, which one do you own?

SILICA SHOP

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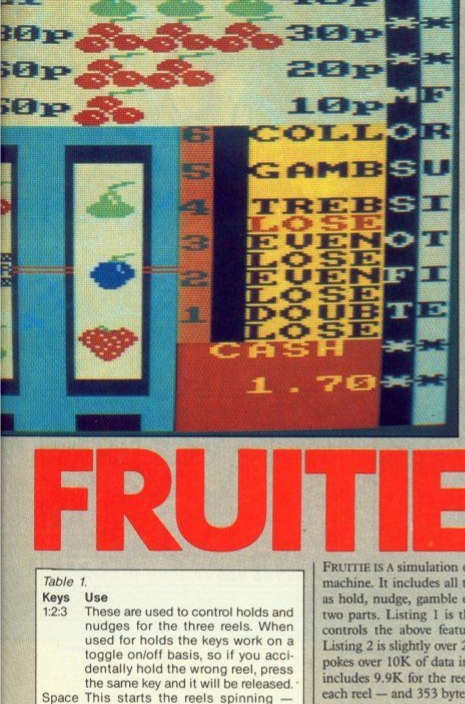
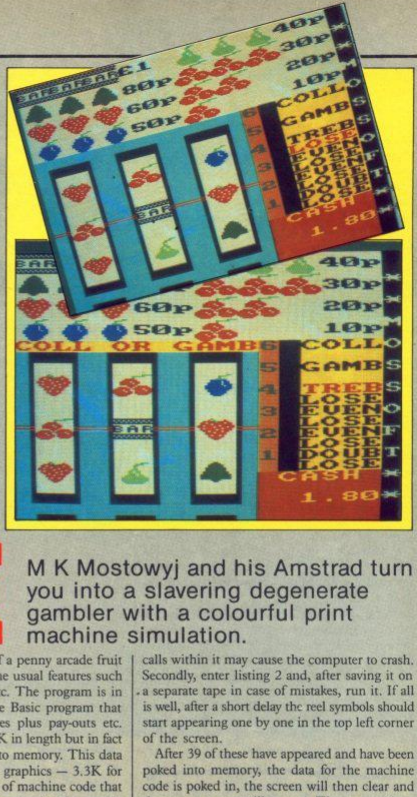
Listing 1.

```
10 MEMORY 29223
20 CLS:PRINT"PLERSE WAIT.   LORDING BYTES!"
30 LORD"!"
40 LORD"!"
50 RANDOMIZE TIME
60 ON ERROR GOTO 1000
70 ENV 1,1,15,1,14,-1,5,5,0,1
80 DIM G$(8):G$(1)="TREB":G$(2)="LOSE" G$(3)="EVEN" G$(4)=G$(2):G$(5)=G$(3):G$(6
90 r1$="SLPECMLSC"
100 r2$="CPSLRECSPA"
110 r3$="SLPELSPCRNE"
120 T$=CHR$(209)+CHR$(143)+CHR$(143)+CHR$(211)+CHR$(209)+CHR$(143)+CHR$(143)+CHR
130 R1$(1)=R3$(1)=R2$(1)=FLAG$(0)=CH$(0)
150 '** MAIN LOOP **'
160 POF=0:F1=1:F2=1:F3=1
170 IF SC<0 THEN GOTO 1510
190 FOR V=1 TO 3 PEN#V.3:PAPER#V.15 CLS#V NEXT
200 WHILE INKEY$="" WEND
210 WHILE INKEY$(47)=-1 WEND
220 SC=SC-10 LOCATE#6,1.3 PRINT#6,USING"###.##";SC/100
230 IF F1=1 THEN A=(INT(RND*10)+5) ELSE A=0
240 IF F2=1 THEN B=(INT(RND*10)+10) ELSE B=0
250 IF F3=1 THEN C=(INT(RND*10+20) ELSE C=0
270 H=H+0
280 IF RND>0.7 AND POF=0 THEN GOSUB 620
290 IF RND>0.3 THEN H=H+1 SOUND 1.30.0.0.1
300 GOTO 160
310 '**** PAYOUT ****'
320 LOCATE 1.1
330 PO$=MID$(R1$,R1+1,1)+MID$(R2$,R2+1,1)+MID$(R3$,R3+1,1)
350 IF PO$="EEE" THEN S=80 GOTO 430
360 IF PO$="CCC" THEN S=30 GOTO 430
370 IF PO$="AAA" THEN S=100 GOTO 430
380 IF PO$="SSS" THEN S=60 GOTO 430
390 IF PO$="LLL" THEN S=50 GOTO 430
390 IF PO$="PPP" THEN S=40 GOTO 430
400 IF LEFT$(PO$,2)="CC" THEN S=20 GOTO 430
410 IF LEFT$(PO$,1)="C" THEN S=10 GOTO 430
420 RETURN
430 LOCATE#4,1.1 PEN#4.7 PRINT#4,"6 5 4 3 2 1 ";CL$#5
440 LOCATE 1,9 PEN 3 PAPER 1 PRINT"COLL OR GAMB";
450 WHILE INKEY$<>"" WEND
460 IF INKEY(52)<>-1 THEN LOCATE 1.9 PAPER 2 PRINT"                    "
470 IF INKEY(62)<>-1 THEN LOCATE 1.9 PAPER 2 PRINT"                    ";:GOTO 490
480 GOTO 450                                                            ";:GOTO 530
490 WHILE INKEY(18)<>-1 WEND
500 WHILE INKEY(18)=-1
510 VX=(VX+2)MOD(8):WX=(WX+1)MOD(8)
520 LOCATE#7,1.VX+1 PEN#7,15 PRINT#7,G$(VX+1);
530 LOCATE#7,1.WX+1 PEN#7,3 PRINT#7,G$(WX+1);
540 SOUND 1,234+(VX#10),2
550 WEND
560 IF WX=1=0 OR WX=1=4 OR WX=1=6 OR WX=1=8 THEN S=0
570 IF WX=1=7 THEN S=S*2
590 IF WX=1=1 THEN S=S*3
590 SC=SC+S
600 POF=1 LOCATE#6,1.3 PRINT#6,USING"###.##";SC/100: RETURN
610 '**** NUDGE ****'
620 POF=0:NU=INT(RND*6)+1
630 PEN #4.4 FOR V=1 TO NU LOCATE#4,1.13-(VX2) PRINT#4,USING"#";V: NEXT PEN#4,7
640 PRINT#5,"  NUDGE  ";NU;
650 WHILE NU>0 AND POF=0
660 WHILE INKEY$<>"" WEND
670 IF INKEY(64)<>-1 THEN A=1 B=0 C=0 GOTO 710
680 IF INKEY(63)<>-1 THEN A=0 B=1 C=0 GOTO 710
690 IF INKEY(57)<>-1 THEN A=0 B=0 C=1 GOTO 710
700 GOTO 660
710 SOUND 1,30.5 GOSUB 900
720 IF NU>0 THEN LOCATE#4.1.13-(NU#2) PRINT#4.USING"#";NU;
740 WEND
750 LOCATE#4.1.1 PEN#4.7 PRINT#4,"6 5 4 3 2 1 ";
760 CLS#5
770 RETURN
780 '**** HOLD ****'
790 FOR V=1 TO 3 PEN#V.3 PAPER#V.15 CLS#V NEXT
800 LOCATE 1.9 PEN 3 PAPER 1 PRINT"    HOLD    ";
810 F1=1 F2=1 F3=1
820 WHILE INKEY$<>"" WEND
830 IF INKEY(64)<>-1 THEN F1=-F1 PRINT#1,CHR$(24) CLS#1
840 IF INKEY(63)<>-1 THEN F2=-F2 PRINT#2,CHR$(24) CLS#2
850 IF INKEY(57)<>-1 THEN F3=-F3 PRINT#3,CHR$(24) CLS#3
860 IF INKEY(47)<>-1 THEN LOCATE 1.9 PAPER 2 PRINT"                    ";:RETURN
870 WHILE INKEY$="" WEND
880 GOTO 830
890 '** SPIN REELS **'
900 R1=(R1+8) MOD(8)
910 R2=(R2+8) MOD(8)
920 R3=(R3+5) MOD(8)
930 CALL &9C52,&A8,&A8,&A8'
940 GOSUB 320
950 RETURN
960 '** RESET GAMBLE **'
970 PEN#7,3 LOCATE#7,1.1 PRINT#7,"TREBLOSEEVENLOSEEVENLOSEDOUBLOSE";:LOCATE#7,1
980 RETURN
990 '**** PRINT SCREEN ****'
1000 FOR V=0 TO 15 INK V.0 NEXT BORDER 0
1010 MODE 0
1020 WINDOW#1.1.4.11.22
1030 WINDOW#2.5.8.11.22
1040 WINDOW#3.9.12.11.22
1050 WINDOW#4.1.12.9.25 PAPER#4.2 PEN#4.5 CLS#4
1060 WINDOW#5.1.18.1.8 PAPER#5.4 CLS#5
1070 WINDOW#6.19.19.1.25 PAPER#6.5 PEN#6.4 CLS#6
1090 PAPER#6,"  * * M O S S O F T * *"
1100 PRINT#7,"  * * F R E U I T I E * *"
1110 FOR V=1 TO 3
1120 PEN#V.5 PAPER#V.2
1130 FOR V=1 TO 12
1140 PRINT#V,CHR$(209);"  ";CHR$(211);
1150 NEXT:NEXT
1160 LOCATE#4.1.2 PRINT#4,t$;
1170 LOCATE#4.1.1 PEN#4.15 PRINT#4,t$;
1180 MOVE 0.142 DRAWR 382.0.3 MOVE 0.146 DRAWR 382.0
1190 IF FLAG=0 THEN CALL &9C52,1.1.1:FLAG=1 ELSE CALL &9C52.0.0.0 R1=R1+1 R2=R2+
1:R3=R3+1
1200 CALL &B84E
1210 SC=200
1220 WINDOW#1.2.3.25.25
1230 WINDOW#2.6.7.25.25
1240 WINDOW#3.10.11.25.25
1250 WINDOW#4.13.14.9.20 PAPER#4.11 PEN#4.7
1260 WINDOW#5.14.14.9.20 PEN#5.14 PAPER#5.5 CLS#5
1270 WINDOW#6.13.16.21.25 PEN#6.1 PAPER#6.3 CLS#6
1290 WINDOW#7.15.18.9.20 PAPER#7.2 PEN#7.15 CLS#7 PRINT#7,"COLL    GAMB";
1300 PRINT#4,"6 5 4 3 2 1 ";
1310 PRINT#6,"  CASH" LOCATE#6,1.3 PRINT#6,USING"###.##";SC/100;
1320 RESTORE 1460
1330 FOR V=1 TO 21
1340 READ t.z
1350 CALL &D6A9,t.z+t4
1360 NEXT
1370 ORIGIN 0.0.500.502.350.348 CLG 4
1380 ORIGIN 0.0.0.0.640.400.0
1390 PLOT 194.290.5 TAG PRINT"#1 ";
1410 FOR V=1 TO 3 READ u$ MOVER -96.-32 PRINT u$; NEXT
1420 FOR V=1 TO 3 READ u$ MOVER -96.-32 PRINT u$; NEXT
1430 TAGOFF
1440 FOR V=0 TO 13 READ x INK V.x NEXT:INK 14.8.20 INK 15.3 BORDER 10
1450 RETURN
1460 DATA 1c000.30256.6c000.30256.1c010.30256.6c010.30256.6c0a0.30768.6c0a0.30768.6c0c0.3076
0.1c0c4.29232.6c0cc.29232.6c0d4.29232
1470 DATA 1c0d8.29232.6c0e0.29744.1c1f0.29744.6c024.30000.6c02c.30000.6c034.3000
1480 DATA 1c03c.30000.6c044.29232
1490 DATA 00.60.50.30.20.100
1500 DATA 9.24.20.6.20.0.2.13.10.12.14.16.18.22
1510 '** END **'
1520 CALL &BC02:CALL &B84E:MODE 1
1530 LOCATE 7.5 PRINT"YOU'VE LOST ALL YOUR MONEY!!"
1540 PEN 3 LOCATE 13.9 PRINT"PRESS ANY KEY TO"
1550 PEN 2 LOCATE 16.11 PRINT"TRY AGAIN."
1570 CALL &BB18
1580 GOTO 140
1590 '** ERROR TRAP **'
1600 CALL &BC02:CALL &B84E MODE 1 PRINT"ERROR ";ERR;" IN LINE ";ERL END
```





FRUITIE

M K Mostowyj and his Amstrad turn you into a slavering degenerate gambler with a colourful print machine simulation.

Table 1.

Keys	Use
1:2:3	These are used to control holds and nudges for the three reels. When used for holds the keys work on a toggle on/off basis, so if you accidentally hold the wrong reel, press the same key and it will be released.
Space	This starts the reels spinning — assuming you still have money.
C:G	Used to choose either Collect or Gamble when you have a winning line.
Large Enter	If gamble is chosen this key is used to stop the flashing symbols on either Even, Doub, Treb or Lose. Your winnings are then adjusted accordingly.

FRUITIE IS A simulation of a penny arcade fruit machine. It includes all the usual features such as hold, nudge, gamble etc. The program is in two parts. Listing 1 is the Basic program that controls the above features plus pay-outs etc. Listing 2 is slightly over 2K in length but in fact pokes over 10K of data into memory. This data includes 9.9K for the reel graphics — 3.3K for each reel — and 353 bytes of machine code that are used to spin the reels and print the payout lines at the top of the screen.

Although listing 2 is discarded once it has poked the relevant data, it would be wise to save it on a separate tape in case of any mistakes you may make when entering the data lines. To get the program running is very simple, first of all enter listing 1 and save it to tape.

Do not run it at this stage as the machine code calls within it may cause the computer to crash. Secondly, enter listing 2 and, after saving it on a separate tape in case of mistakes, run it. If all is well, after a short delay the reel symbols should start appearing one by one in the top left corner of the screen.

After 39 of these have appeared and have been poked into memory, the data for the machine code is poked in, the screen will then clear and the save message will appear. The two sections of memory that are about to be saved should be saved directly after listing 1, so make sure the tape is wound to the correct position before inserting it and proceeding to save the bytes.

Once this is completed reset the computer, rewind the tape and run it. If all is well listing 1 should auto load the other two parts.

Listing 2.

```
10 SYMBOL AFTER 224:DIM x(8):FOR v=224 TO 253:FOR u=1 TO 8
20 READ x$:x(u)=VAL("&"+x$):NEXT
30 SYMBOL v,x(1),x(2),x(3),x(4),x(5),x(6),x(7),x(8):NEXT
40 PAPER 4:PEN 1:MODE 0:WINDOW#0,1,2,1,4:PRINT CHR$(22);CHR$(1):PAPER 4
50 des=29232:MODE 0:WINDOW#0,1,2,1,4:GOSUB 120,140,160,180,200,220:NEXT
60 FOR v=1 TO 39:READ a:ON a GOSUB 120,140,160,180,200,220:NEXT
70 POKE 1:PEN 1
80 FOR a=40000 TO 40352:READ b$:POKE a,VAL("&"+b$):NEXT
90 SAVE "CODE",b,29232,9984:SAVE "!CODE1",b,40000,353
100 ENT:
110 z=LC000:w=z:FOR a=1 TO 4:FOR b=1 TO 8:FOR c=1 TO 6
118 POKE des,PEEK(z):z=z+1:des=des+1:NEXT:z=z+2040:NEXT:w=w+80:z=w:NEXT:RETURN
120 CLS:PEN 9:LOCATE 1,2:PRINT CHR$(226);CHR$(227);CHR$(228);CHR$(229);
130 GOSUB 100:RETURN
140 CLS:PEN 3:LOCATE 1,2:PRINT CHR$(230);CHR$(231);CHR$(232);CHR$(233);:LOCATE 2
,2:PEN 12:PRINT CHR$(234);
150 GOSUB 100:RETURN
160 CLS:PEN 5:LOCATE 1,2:PRINT CHR$(235);CHR$(236);CHR$(237);CHR$(238);
170 GOSUB 100:RETURN
180 CLS:PEN 3:LOCATE 1,2:PRINT CHR$(239);CHR$(240);CHR$(241);CHR$(242);:PEN 12:L
OCATE 1,2:PRINT CHR$(224);CHR$(225);
190 GOSUB 100:RETURN
200 CLS:PEN 6:LOCATE 1,2:PRINT CHR$(244);CHR$(245);CHR$(246);CHR$(247);:PEN 12:L
OCATE 2,2:PRINT CHR$(248);
210 GOSUB 100:RETURN
220 CLS:PEN 13:LOCATE 1,2:PRINT CHR$(249);CHR$(250);CHR$(251);CHR$(252);:PEN 12:
LOCATE 2,2:PRINT CHR$(253);
230 GOSUB 100:RETURN
240 DATA 02:01:01:00,00,00,00,00:00,00,00,00,00,00,00,00
250 DATA 01:03:07:07,0F,0F,1F,1F:00,C0,E0,E0,F0,F0,F0,F0
260 DATA F8,FC,FC,FC,FC:C0,00:00,00,00,00,07,0F,1E,1E:1F,1F,00,00,00,00,00,00,00
270 DATA 03:3D:7E,F6,FB,FF,7E:3C,BC,7E,F7:7B,7F,7E:3C,00,0F,F8:00,00,00,00,00,00
280 DATA FF,55,AA,FF,00,E1,92,E3,FF,55,AA,FF,00,0E,49,CE,92,E2,00,FF,55,AA,FF,00
290 DATA 49,49,00,FF,55,AA,FF,00,00,00,04,1E:27,3D,6F,7E,2F,00,10,78,EC,FC,BE,F6:DC
300 DATA 3F,1B,0E,0F,05,07,03,01,7C,D8,F0,F0,A0,E0,C0,80,04,02,03,00,00,00,00,00
310 DATA 00,00,00,00,03:03:07,07,00,00,00,00,F0,D8,D8,DC,0F,0F,0F,07,07,03,03:01
320 DATA EC,FC,F8,F8,F0,F0,E0,C0:0C,70,40,F0,00,00,00,00,00,00,00,00,00,00,00,00
330 DATA 00,00,00,00,C0,C0,60,60,03,07,0F,1F,1F,1F,0F,07,A0,B0,F8,FC,FC,FC,F8,F0
340 DATA 1C,70,C0,00,00,00,00,00
350 DATA 2:4:5:6:2:2:1:6:5:4:2:4:5:3:6:4:2:1:3:5:4:6:2:3:6:4:1:3:2:6:4:5:1:6
360 DATA 5:4:1:3:2
370 DATA 00,00,00:00,00,00:79,24:C3:30:96:54:C3:30:93:44:C3:DD:7E,00:32:44:9C
:DD:7E:02:32:42:9C:DD:7E
380 DATA 04:32:40:9C:3A:40:9C:FE:00:20:48:3D:32:40:9C:06:00:C5:01:00:00:2A:4E:9C
:ED:5B:49:9C:D5:ED:B0:22
390 DATA 46:9C:E1:01:00:08:09:30:04:01:58:C0:09:22:48:9C:C1:10:DE:21:24:C3:22:49
:9C:2A:4E:9C:11:20:00:ED
400 DATA EB:01:00:00:09:30:ED:20:04:11:00:08:19:22:46:9C:3A:42:9C:FE:00:20:04:11
:50:C0:09:22:4C:9C:C1
410 DATA C5:01:00:00:2A:4A:9C:ED:5B:4C:9C:D5:ED:B0:22:4A:9C:E1:01:00:08:09:30:04
:11:50:C0:09:22:4C:9C:C1
420 DATA 10:DE:21:24:C3:22:4C:9C:2A:4A:9C:11:20:03:A7:ED:52:3E:7F:BC:20:09:3E:30
:ED:20:04:11:00:08:19:22
430 DATA 4A:9C:3A:44:9C:FE:00:20:11:3A:42:9C:FE:00:C2:64:9C:3A:40:9C:FE:00:C2:64
:9C:CD:D0:22:44:9C:06:00
440 DATA C5:01:00:00:2A:4E:9C:ED:5B:50:9C:D5:ED:B0:22:4E:9C:E1:01:00:08:09:30:04
:01:50:C0:09:22:50:9C:C1
450 DATA 10:DE:21:44:C3:22:50:9C:2A:4E:9C:11:20:03:A7:ED:52:3E:BC:BC:20:09:3E:30
:BC:20:04:11:00:08:19:22
460 DATA 4E:9C:CD:D0:22:C9:F8:72:A4:C2:DD:6E:00:DD:66:01:22:66:9D:DD:6E:02:DD:66
:03:22:68:9C:06:10:C5:01
470 DATA 00:00:2A:66:9C:5E:68:9D:D5:ED:B0:22:66:9D:E1:01:00:08:09:30:04:01:50
:C0:09:22:68:9C:C1:10:DE:C9
```

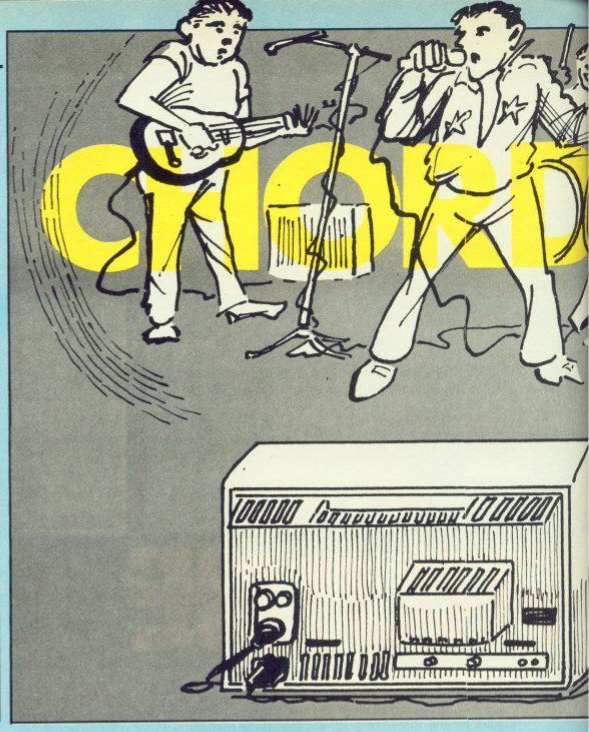
THE CHORD symbol system, along with the rest of music notation, has archaic origins, and has evolved to its present day state. The result is a system that, although reasonably consistent, is cluttered, widely misinterpreted and full of conventions, i.e., rules having little logical basis and so only learnable by experience.

However, like the English language — and Basic? — at least it has the advantage of having settled down into an established standard, agreed on by almost all; even a 1930's jazz musician could follow most of what's printed on a modern Casiotones chord buttons! This program boils chord structure for guitarists down into a very *easy to use* expert system.

It accepts any chord name typed in simply as read from sheet music, and takes into account all recognised variants by which chords are known — but if you type in rubbish don't blame me for the results! Unlike chord books or simple chord programs, which store a few standard chord shapes, Chordata scratch builds each chord you ask it.

This makes it extremely flexible and able to work out virtually *any* chord, of any type, whether old, contemporary or yet to be fashionable, in any key, at any fret position, and *also* for any tuning of any stringed instrument; a total of many thousands of chords. Although it works from theory it also weeds out what experience tells me are impractical combinations of notes e.g., an eleventh chord *technically* includes a third as well as a fourth, but the third is omitted in practice.

Eventually — well, six seconds — you are given a simple display of the guitar neck, showing finger positions as you would see them if playing your guitar in front of a mirror. Some people prefer the more conventional — but illogical — view with treble strings uppermost, so I have included a control to flip between




```
   0 REM CHORDATA:J.Dave.Rogers/
     Walton.Liverpool/1984
   5 RUN 2000
   9 REM ---------------------
                 NEW CHORD
  10 BORDER 0: PAPER 0: INK 1: B
RIGHT 0: CLS : PRINT #5;#0; FLAS
H 1;"Press any key"
  20 BRIGHT 1: INK RND+8 : LET x=
INT (RND*8)+7: LET y=INT (RND+
5)+4 : PRINT AT y,x;"BMIU";AT y+1
,x;"KL"
  30 IF INKEY$="" THEN GO TO 20
  40 BORDER 1
  50 POKE 23617,253: POKE 23609,
   22: POKE 23658,0
  60 INPUT (FLASH 1; PAPER RND+
7; INK 9);" Please enter chord
required ";LINE c$
  70 LET c$=" "+c$+"....."
  80 LET p=4 : GO SUB 1000: LET
root=v: IF root=0 THEN GO TO 10
  90 LET b$="R...3..5....." : LET
   bass=0
  99 REM ---------------------
                FIRST SEARCH
 100 FOR p=5 TO LEN c$-7 : LET ps
=c$(p TO ) : LET x$=c$(p TO p+1)

 110 IF x$="11" THEN LET b$=
"r..9..4..u.7.."
 120 IF x$="13" THEN LET b$=
"r..n.3..5..67."
 130 IF x$="-5" OR x$="b5" OR x$
="5b" THEN LET b$(7 TO 8)="5."
 140 IF x$="di" OR (p$="o" AND
 c$(p-1)=" ") THEN LET b$=
"R..3..5..7.."
 150 LET x$=c$(p TO p+2)
 160 IF x$="aug" OR p$="+" OR x$
( TO 2)="#5" OR x$="(5#" THEN LE
T b$(6 TO 9)="#5"
 170 IF x$="no3" THEN LET b$(4
 TO 5)="..."
 180 IF x$="no5" THEN LET b$(7
 TO 8)="..."
 190 IF c$(p+1 TO p+3)="ass" THE
N LET c$(p)=" " : LET p=p+1-(c$(p
+2)="a" AND c$(p-2)="g") : GO S
UB 1000: LET bass=v: LET p=p+4
 200 NEXT p
 205 REM ---------------------
 210 LET a$=b$ : IF b$(5)="3" THE
N LET b$(5)="t"
 220 REM ---------------------
                SECOND SEARCH
 230 FOR p=5 TO LEN c$-7 : LET x$
=c$(p TO ) : LET p$=c$(p)
 240 IF p$="/" THEN IF x$(2)="s
" AND x$(3)="d" AND x$(2)="9"
THEN LET p=p+1 : GO SUB 1000: LET
 bass=v
 250 IF p$="m" AND x$(TO 3)<>"m
aj" THEN LET b$(4 TO 5)="t.." : LE
T a$(4 TO 5)="3"
 260 IF p$="6" OR x$( TO 2)="13"
THEN LET b$(10)="s" : LET a$(10)
="6" : IF a$(8)="5" THEN LET
 b$(8)="f"
 270 IF p$="7" THEN IF a$(12)<>"
7" AND a$(10)<>"7" THEN LET a$(1
1)="7" : LET a$(1)="r" : LET b$
(11)="s"
 280 IF x$( TO 3)="sus" OR p$="4
" THEN LET a$(5 TO 6)=".4" : LET
 b$(5 TO 6)="u."
 290 IF x$( TO 3)="-10" THEN LET
 b$(9)="9"
 300 IF x$( TO 4)="maj7" OR x$(
TO 4)="maj9" THEN LET a$(12)="
7" : LET a$(1)="r" : LET b$(12)="s
"
 305 IF x$( TO 2)="11" THEN LET
 b$(11)="R" : LET a$(10)="n"
 310 REM -----NINTHS---------
 320 IF p$(>"9" THEN GO TO 390
 325 LET x$=c$(p-1): LET n=(x$=
"#") - (x$="b" OR x$="-") : IF n THE
N LET a$(3+n)="9" : LET a$(3)=
" " : LET b$(3)="." : GO TO 390
 330 LET a$(3)="9" : LET b$(3)="n
" : LET a$(5)=" " : IF a$(5)="3"
 THEN LET a$(5)="t" : GO TO 390
 340 IF p>5+2+sh( THEN GO TO 390
 350 PRINT #0; FLASH 1;"Jazz or
added ninth ?"
 360 LET k$=INKEY$: BEEP RND/4,
 RND+22
 370 IF k$="" THEN GO TO 360
 380 IF k$="y" THEN LET a$(11)="
7" : LET b$(11)="s" : IF b$(5)="t"
 THEN LET b$(5)="3"
 390 NEXT p
 391 REM ---------------------
 395 INPUT " PRINT ";#0; FLASH
1;"Working out ";c$
 400 REM ---------------------
                ADJUSTMENTS
 410 IF a$(10 TO 11)="67" THEN L
ET a$(10 TO 11)="6$" : LET b$(10
 TO 11)="s7" : LET b$(11)="."
 415 FOR n=3 TO 4 : IF a$(n TO n+
1)="93" THEN LET a$(n TO n+1)=
"91" : LET b$(n TO n+1)="n3"
 420 NEXT n
 430 LET a$=a$(14-root TO )+a$
 440 LET b$=b$(14-root TO )+b$
 450 IF bass THEN LET root=bass
 : FOR n=bass-2 TO bass+2 : LET p
=n+12+(n<(n-12)) : LET b$(p)=
("N" AND b$(p)<>".")+b$(p) : NEXT
 n : LET b$(bass)="B"
 460 LET i$="DDDDDDDDDD"
 470 LET j$="PPPPPPPPPPPP"
 480 FOR n=1 TO LEN a$
 490 IF a$(n)=" " THEN LET a$(n)
="D" : GO TO 510
 500 LET i$(n)="MN"(1+(b$(n)="a
")) : GO TO 530
 510 IF b$(n)=" " THEN LET b$(n)
="R" : GO TO 530
 520 LET j$(n)="MN"(1+(b$(n)>="s
")) : GO TO 530
 530 NEXT n
 540 LET g$=c$(root)+"■"
 550 REM ---FILL-PLAY-ARRAY----
 560 DIM p(48) : LET pa=1 : LET p(
1)=root-1-(root>12) : LET s$=b$+a$
 570 FOR n=1 TO LEN a$
 580 IF a$(n)<>R$ 128 THEN LET
 p(pa)=n+1 : LET p(pa)=n-1
 590 NEXT n
 600 REM ---------------------
              FILL GUITAR STRINGS
 610 FOR s=1 TO 5
 620 LET g$(s)=u$ AND s<4)+v$
 630 LET g$(s+5)=g$(s)
 640 IF s>3 THEN LET b$=a$ : LET
 g$=i$
 650 BEEP .01,12+s
 660 FOR f=1 TO 19 : LET g$(s,f+4
)=b$(n(s,f)) : LET g$(s+6,f+4)=
j$(n(s,f)) : NEXT f
 670 IF g$(s,4)=g$(s,5) THEN
 g$(s,6)="0"
 680 NEXT s
 700 REM ----PRINT-OUT-----
 710 BORDER VAL "7750173107"(1+c
ol) : INK 9: PAPER 7+(col=2+INT
 (col/2)) : BRIGHT col=6 OR col=7

 720 CLS : : : : : : : : : : : PRINT "
```

Find that chord with the push of a button.

J. Dave Rogers and a ZX-81 explain how to fret without worrying.

either view. Keys Z and X let you scan up and down the neck to see different frets. The neck display is held in an array — GS — using one character string per guitar 'string'. Several UDG's are used for the frets and thick/thin strings. For beginners, a simplifier can be selected which shows chords as small, easy-to-grasp shapes to play.

For more advanced players the simplifier can be switched off so that a greater length of the fretboard can be seen at one time. This mode shows not only all the notes usable for a given chord but also their *scale relationships* e.g. root, third, ninth, etc, which is useful for learning about harmony and the anatomy of chords, or as an aid to composing solo runs — or bass guitar runs — to fit in with a given chord sequence.

As far as fingering the chords is concerned, an obvious shape will usually suggest itself. The more complex types of chords however can have several alternative ways of being played. There may even be two notes indicated on the same string within a few frets of each other and they obviously can't both be played, even though *they are all legitimate notes for that chord.*

So, to help sort out which to choose I have made 'top priority' notes appear in capitals, with less important or optional notes in lower case letters. Although all the 'standard' chord shapes can be seen, the program can also throw up, if you'll pardon the expression, less common ways of playing chords.

Don't be conservative, try them all, see which *you* prefer — you've nothing to lose but your fingernails — and remember that each inversion may be just what's needed to suit a particular piece of music rather than the others.

Also, carefully chosen *parts* of a chord — residues — can sound just as strong as a huge six-string-five-fret-wrist-wrecker, especially when playing in combination with other instruments — or a good echo-chorus unit!

There now follows a potted chord theory: A chord symbol such as E means the basic chord of E major, which consists of the first — root, third and fifth steps of the rising major scale of, in this case, E — and their octaves. Minor, sus 4, augmented and flattened fifth chords are formed by *altering* — raising or lowering — the third or the fifth.

Added notes can then include the sixth, various sevenths, ninths, and so on, in any combination. The added notes generally sound better if confined to the higher-pitched strings, so the program indicates this automatically. In fact, if a seventh or other added note is required as a bass note than it can be written not as a seventh but as 'chord over bass note' e.g. D/C, and this notation is allowed for in the program.

It became more common as the main system failed to *conveniently* describe some contemporary chords, e.g. if the chord A/D had to be named with D as its root — but still as *exactly* the same notes — it would be called D maj 7/9/no 3rd. The newer notation is more descriptively accurate, yet short to write and quick to understand (like good computer language should be!).

If typing errors are made when entering games programs then something obvious will usually happen — or at least fail to happen — but with a utility/educational program, such as this one, errors may give you an *apparently*

(continued on next page)

```
          CHORCATA
  P=PLAY  J.D.Rogers
  N or A-G=New chord      @84
  Z/X=Scan down/up frets
  V=Alter view, 0-9=colours
  S=simplifier step, T=Re-tune
740 PRINT "  THIS IS ";INK VA
L "1846263624";(1+COL);CS;AT 21,1
"FCT ";BO;" Gtr Tuning ";t$
750 PAPER COL
760 IF simp=2 THEN GO TO 800
770 DIM q$(384)  PRINT AT 8,0;q
$
780 PRINT AT 9,21;"■" and "M";TAB
20;"main finger";TAB 20;"positi
ons";TAB 21;"■root";AT 14,19;
"N play if no";TAB 20;"alternati
ve";AT 17,19;"DO not play";TAB 1
9;"open strings";TAB 19;"unless=
c"
800 PRINT AT 5,0;"
                    ";AT 20,0;"
                    "
810 LET x=6 AND simp=1 LET a=
 (fr+31-(14 AND simp=2))
820 PRINT PAPER 8;AT 21,6;"
 FLASH 1;AT 21,6;(fr+2)/4
830 PRINT AT 8,0
840 FOR s=1 TO 5  IF view THEN
  FOR s=6 TO 2 STEP -1
850 PRINT g$(s+x,fr TO a);  PRIN
T e$(fr TO a)
860 NEXT s
870 PRINT g$(s+x,fr TO a)
890 REM          USER CONTROLS
900 IF play THEN FOR n=1 TO pa:
BEEP .02+(pp/2,p(n)):  IF INKEY$
 <> "" THEN NEXT n:  GO TO 900
910 LET k$=INKEY$
915 POKE 22539+RND*7,8*INT (PEE
K 22539/8)+1+RND*5
920 IF k$="  " THEN GO TO 910
930 IF k$="p" THEN LET play=NOT
 play
940 IF k$>="0" AND k$<="9" THEN
 LET col=CODE k$-48:  GO TO 700
950 IF k$="n" THEN GO TO 10
960 IF k$>="a" AND k$<="g" THEN
 GO TO 40
970 IF k$="v" THEN LET view=NOT
 view
980 IF k$="s" THEN LET simp=VAL
 "201"(1+simp):  GO TO 750
990 LET fr=fr+(4 AND k$="x" AND
 fr<45)-(4 AND k$="z" AND fr>4)
991 IF k$<>"t" THEN GO TO 800
992 REM ---OPTIONAL-RETUNER---
993 CLS : PRINT "Enter tunin
g required for six  strings,pass
 string (first) using this exact f
orm:e.g.,"'"d a e g a b e"'"
(example is jdr's D6/9 tuning)
,(OR Enter n to return to norm
al)"
994 INPUT LINE T$: CLS :  IF LEN
 T$<12 THEN GO TO 4020
995 IF T$="n" THEN RUN
996 GO TO 992
1000 REM
          NOTE-TO-NUMBER
1010 LET p$=c$(p):  LET c$(p)=
 CHR$ (CODE p$-32)
1020 LET v=0
1030 FOR n=1 TO 7
1040 IF p$="cde/gab"(n) THEN LET
 v=VAL "0103050605101 2"(n*2-1 TO
 n*2)
1050 NEXT n
1060 LET sh=(c$(p+1)="#")-(c$
 (p+2)="b")
1070 IF sh THEN LET v=v+sh:  LE
T p=p+2:  LET c$=c$(: TO p-1)+"  "+
 c$(p TO )
1080 RETURN
1200 REM
          SETTING-UP
2010 PRINT "Please wait"
2020 LET fr=0:  LET s=0:  DIM g$(12
,73):  DIM n(6,20):  DIM s$(12):  D
IM e$(12):  DIM j$(12):  LET fr=2
 LET g$="  ":  LET col=6:  LET simp
 =0:  LET view=0:  LET play=0
2030 LET u$="  ":  LET v$="  "
2040 LET w$="  ":  LET x$="  "
2050 LET e$="  "
2060 FOR n=1 TO 20
2070 LET u$=u$+"  ":  LET v$=v$+
 "  "
2080 LET w$=w$+"  ":  LET x$=x$+
 "  "
2090 LET e$=e$+"  "
2100 NEXT n
2110 LET e$(52)="  "
2120 LET h$="  ":  LET h$=h$+"  "
2130 LET h$=h$+h$:  IF LEN h$<700
 THEN GO TO 2130
2140 LET h$=h$(: TO 704)
2150 IF LEN (a$+b$+j$+x$+g$(12)+
u$+v$+e$+h$)<>1076 THEN PRINT "E
RROR in lines 2000 to 2150";,jdr
3000 REM ---------UDG's---------
  A B C D E F G H I J K L M N O
  P R E S E N T G H I J K L M N O
3010 DATA 0,0,0,0,255,170,0,0,25
5,255,255,126,255,170,126,255,15
,15,15,15,255,255,0,0,0,0,
255,0,0,0,255,255,255,126,255,12
6,255,255,15,15,15,15,255,15,15,
15
3020 DATA 0,3,63,29,13,13,253,12
7,56,252,252,248,95,85,248,124,0
,0,0,0,255,85,0,0,0,0,24,252,9
5,0,0,19,96,64,48,8,48,192,128,2
52,48,0,0,0,0,0,0:  REM "guitar"
3030 DATA 24,60,110,235,215,118,
60,24,0,0,16,84,255,84,16,0,74,4
6,68,97,116,101,46,82,111,103,10
1,114,115
3040 FOR n=USR "a" TO USR "p"
3050 READ r:  POKE n,r:  LET s=s+r
3060 NEXT n
3070 IF s+n<>76042 THEN PRINT "e
rror in data";,jdr
4000 REM --TUNE-UP-NOTES-ARRAY--
4010 LET t$="  d a d g b e":
4020 LET c$=t$:  LET p=2
4030 FOR s=1 TO 6
4040 GO SUB 1000
4050  FOR f=1 TO 20:  LET n(s,f)=
 v:  LET v=(v AND v<(12)+1):  NEXT f
4060 LET p=p+2
4070 NEXT s
4080 PRINT AT 20,0;"test chord"
 LET a$="dmaj7/9/#bass":  LET
 simp=2:  GO TO 70
4090 GO TO 10
9995: REM
          POKE UDG's TO LETTERS
          WITH A "STRIPE" FOR LISTING
9997:LET ad=15880:  FOR n=USR "a"
 TO USR "p":  POKE n,PEEK ad+128:
 LET ad=ad+1:  NEXT n
9998 REM Thanks to Els+Les(tea+
 typing)
9999 POKE 23693,56:  CLS :  BORDER
 7:  PRINT "instant normality":  L
IST 9e3
```

Table 1.
Spectrum-specified Pokes etc.

0	A zero line is obtained by the direct command: Poke 23756,0.
10	h$ is a screen-sized string used as a 'backdrop'.
50	The first Poke changes the Input-cursor character, the second Poke makes the Spectrum's key-beep more audible and the third Poke switches Caps-shift off.
60	'Line' allows string input without the quotes being shown.
395	Performs a CLS on the bottom two lines only, #0 Prints to the bottom of the screen.
450	use of boolean logic with b$ allows a 'complete algorithm within a line'. Use of 'If's would have caused the rest of the line to be ignored if a condition was false.
560	Sinclair arrays can be re-dimensioned even when already set up.
500/520	The first or the second of the characters in quotes is sliced out depending on whether b$(n) is an upper-case or lower-case character.
710	Border colours are sliced directly out of a string using 'Val'.
720	Using one big string takes less memory and prints faster than if using lots of separate 'Print At's.
840	If 'view' equals one then the second version of the For-Next loop is set up and the one that was first set up is ignored. *Not* recommended on non-Sinclair machines!
915	Pokes the attributes file to flash random *INK* colours only. The bits that are significant for Paper/Flash/Bright are masked off by the function 8* INT (Peek/8).
2150	Checksum for strings.
3070	Checksum for UDG data.
9997	Reads character bit-patterns from the Rom and Pokes them into the UDG's, but by adding 128 a 'stripe' is added down one side to highlight the UDGs in the listing. Adding 129 would give a stripe on the other side as well.

R	r	Root note of chord
B		Bass (if altered root)
3	t	Third (minor or major)
5	f	Fifth (flattened, perfect or augmented)
7	s	Seventh (diminished, dominant or major)
6	s	Sixth
9	n	Ninth (flattened, dominant or sharpened)
4	u	Fourth (suspended or eleventh)
If a main note.		If an optional note.

(continued from previous page)

working program but one that spouts a load of misleading rubbish. I made up the (rather unlikely) 'test chord' in line 4080 to test as many parts of the search algorithm as possible.

If you do not get *exactly* what's shown in figure 1 then there is an error somewhere. When a Run gives the correct result you can erase line 4080, then make final copies using Save "chordata" line 1.

User-definable characters — to be entered in Graphics mode — are highlighted in the listing as capital letters *with a stripe*. To return them to this form, for checking, you must Run 9000 — this copies character bit-patterns from the Rom. It is also most important to notice where capital or small letters are used in the listing, because this is used as a note-priority marker.

For this reason check all lines in the search loops even more carefully than usual. Note that some lines in the listing have been padded out with spaces to clarify their appearance. Lines 540, 780 and 2050 use graphic shifted eight (*not* inverse video space).

In use, the 'sharp' sign can be found on key 3. For flats, as on all music, a small b is used. If you come across a natural sign — — then type maj instead. It is *not* necessary to put capitals or spaces when typing in a chord, these will be inserted later by the program itself where needed for clarity e.g. Type in abbbbass and see how the four b's get sorted out into Ab/Bb Bass.

Figure 1.

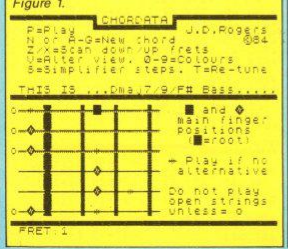


Table 2. Main Variables.

C$	Chord name, inputted by user.	g$(s)	Guitar 'strings', literally.
B$	'Allowed notes' for given chord (separate sets for bass/treble strings).	e$	Empty string, used to keep the guitar strings spaced-out.
A$		N(s,f)	Notes reference array (string, fet)
X$	Extracted items from C$	col	Colour/options for display
P	Pointer for search through C$	T$	Tuning for open guitar strings
V	Value returned from note-to-number subroutine.	Simp	Simplifier, on/off
root	Root note of chord.	view	View, up/down 'flags', 0 = off
bass	New root note if 'altered bass'	play	Play notes, on/off
i$/j$	Simplified versions of b$/a$.	Shf	Sharps and flats
		p (pa)	Play-array

For 9th chords you are prompted to choose jazz or added, the former includes a seventh, the latter doesn't and sounds more contemporary — used extensively by The Police. Any chord +7 means augmented fifth and dominant seventh, *not* a sharpened seventh. A 13th chord includes the sixth and seventh, usually an octave apart, sometimes the ninth, optionally the fourth and theorectically the root, third and fifth.

If the program is typed in error-free (!) then at least 99.9 per cent of chords typed-in off sheet music will be worked out correctly. Don't believe those who tell you "that's not how I play" whatever, many guitarists have their own somewhat loose idea of chord names.

Even sheet music is not infallible and can contain chord shapes or names that are unsuitable or just plain wrong e.g. G eleventh (G11) is used sometimes to mean F/G but sometimes to indicate G7 sus 4.

Structure-wise (horribobble word) the program flows straight through from line 10 to 900. The main variables to try and follow are a$, b$, c$, p and x$. Both searches through the inputted chord name (c$) use a pointer (p) to keep track of everything. P is incremented for example to accommodate "sharps and flats" in the routine at 1000. Allowed notes for the chord in question are built up in a$ — for the three treble strings — and in b$ — for the three bass strings. B$ gets started off containing a major triad in line 60.

The filling of the actual guitar-strings array (G$) is all done in line 660 as follows: For each guitar-string/fret position (S, F) the fixed reference array N is sliced to find the note-value at that S, F. The resulting number — range 1 to 12 — is used to slice out a character from a$/b$ — allowed notes data — which is then put into G$ at the current string/fret.

Table 3. Some chords to try, from simple to complex, showing just some of the types that may be found on sheet music.

E7	*D*	*Dm7*	*Fmin*	*Am*
Am(maj 7)		*Am7*	*Bb6*	*C7-9*
F	*F6/4*	*Esus*	*Eaug*	*D/E*
C(Bb	*Am/F*	*B7-10*		*Em(add 9)*
Cm7/9		*A7(b9)*		*Abmaj7*
B9		*A6/4/GBass*		*Dmajg*
Bbm7		*C11*		*F#dim*
F#m7(5b)		*G*	*A13*	*D(9)*

This character could be a symbol or just a bit of guitar string — to fill the gap — depending on whether the note was an allowed one for the current chord or not.

Since the Spectrum Beep is monophonic — not to mention barely audible — the only way to give at least an impression of a chord is to play the notes of the chord rapidly in succession. This is done by storing the notes of the chord into a play array, P — sound better through a proper amp.

Note that throughout this program I use 1 to represent C, 2 for C sharp, 3 for D and so on. The Spectrum's Beep uses the same system but one lower (0 = C) hence the need for 'n-1' in line 580.

I can supply a ready-taped version of Chordata which includes extra text screens. Send £2.50 to 11 Carnarvon Road, Walton, Liverpool, L9 1EB. Note that I refuse to have anything to do with fans of Wham! ■

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SP

J G Fountain gives your Amstrad a schizoid screen.

THE PROGRAM Split uses the built in interrupt facilities on the Amstrad to split the display into separate areas and provide them with separate colour pallettes, thus allowing the machine to have more colours on screen than normal. The program actually splits the screen into two sections, the upper retaining the normal screen pallette and hence responding to the normal Basic commands for controlling the ink colours.

The lower area however is given a completely new pallette and hence new commands have to be provided to control the inks though the colours available are the same 27 hardware colours.

The new commands are provided using Resident System Extensions, which have been well described in various publications and are fully documented in the *Complete CPC 464 Operating System Firmware Specification Soft 158*. Basically an RSX command is a user defined extensions to the Basic language and provides a method for calling machine code routines by name rather than address.

For the control of the lower area of the screen 4 RSX commands are provided:-

:SPLIT,p,n, — splits the screen at position p where p is in the range of 0 to 4, 0 being the bottom of the screen and 4 being the top. n inks are associated with the new pallette ie. if n=0 none of the inks are changed in the lower area of the screen, if n=16 then all of them are changed the border always being split.

:SPLITOFF — returns the display area to its normal format.

:LOINK,i,c — sets ink i to colour c in the lower area of the screen.

:LOBORDER,c — sets the border to colour c in the lower area of the screen.

These RSX's have to be initialised by the Basic instruction

CALL 34000

though this address can be changed by changing the two ORG definitions in the assembly pro-

```
;
;                    RSX INITIALISATION ROUTINE
;                    --------------------------
;
; This routine is called from basic and initialises the RSX commands.
;
RINIT:  ORG 34000
        LD BC,RCMDTB        ; Address of command table
        LD HL,RWRKSP        ; Address of work space
        CALL &BCD1          ; KL LOG EXT
        RET                 ; Return to basic
;
;                    SPLIT SCREEN COMMAND ROUTINE
;                    ----------------------------
;
; This routine is called when the RSX command SPLIT,n,m is found by the Basic
; Interpreter. It splits the screen at position 'n', providing a new palette
; for the first 'm' inks. If there are no parameters it defaults to SPLIT,1
; If there are too many parameters it exits via the Error routine.
;
SPLIT:
        CP 0                ; Check for parameters
        JR NZ,SPRAM         ; If at least one jump to handle it
        LD A,4              ; Else default to SPLIT,1
        LD (POSTN),A        ;
        LD A,&6             ;
        LD (DELAY),A        ; Set loop counter
        JR SPIN             ; then jump to initialise Ticker blocks
SPRAM:  CP 1                ; Check if there is 1 parameter
        JP Z,SP2            ;  Jump to Handle it
        CP 2                ; Check if there are 2 parameters
        JP NZ,PCERR         ; Jump to error routine if not
;
;
;                    SET NO OF INKS TO BE CHANGED
;
        LD A,(IX)           ; Get lo byte of P2
        CP 17               ; Limit the parameter
        JR C,SP4            ;  to between 0 and 16
        LD A,16             ;
SP4:    LD (ILIMIK),A       ;
        INC IX              ; Point parameter stack pointer at
        INC IX              ;  the first parameter on the line
;
;                    SET SPLIT POSITION
;
SP2:    LD A,(IX)           ; Get parameter
        ADD A,3             ; Limit the parameter value
        AND 7               ; to between 3 and 7
        LD E,A              ; Save the split position parameter for later
        SUB A,3             ; Bring back to range 0 to 4
        LD B0,LOOPTAB       ; Get the loop table start address
        ADD A,C             ; Add offset ( ADD BC,A )
        LD C,A              ;
        JR NZ,SP1           ;
        INC B               ;
SP1:    LD A,(BC)           ; Get the loop driver value from table
        LD (DELAY),A        ; Load loop driver temp. store
        LD A,E              ; Get the split position parameter again
        LD (POSTN),A        ; Set split position variable
;
;
;                    INITIALISE FRAME FLYBACK
;
SPIN:   LD HL,FXBLK         ; Address of Frame Flyback Event block
        LD B, &81           ; Class of interrupt. Asynchronous Event
                            ;  with a routine in RAM
        LD C, &FF           ; Rom number. Not applicable
        LD DE,FRTN          ; Address of routine
        CALL  &BCD7         ; KL NEW FRAME FLY
;
;                    INITIALISE FAST TICKER BLOCK
;
        LD HL,FTBLK         ; Address of Fast Ticker Event block
        LD B, &C1           ; Class of interrupt. Asynchronous Express Event
                            ;  with a routine in RAM
        LD C, &FF           ; Rom number. Not applicable
        LD DE,FTRTN         ; Address of routine
        CALL  &BCE0         ; KL NEW FAST TICKER
        RET                 ; Return to Basic
;
;                    FAST TICKER ROUTINE
;                    -------------------
; This routine is called every 3.33 mS. It checks where the screen scan has got
; to and if this matches the split position then the ink colours are  changed.
;
FTRTN:
        LD A,(PCOUNT)       ; Get the frame position counter
        LD HL,POSTN         ; Get position at which to split the screen
        CP (HL)             ; Check if they are equal
        JR NC,FTPASS        ; If they are not the same, do not change the
                            ;  palette
;
;
;                    LOAD IN THE NEW PALETTE
;                    -----------------------
        LD A,(DELAY)        ; Get delay time length
        LD B,A              ; Move it into B
FTLOOP: DJNZ FTLOOP         ; Delay loop to get change of
                            ;  colours at character line boundry
        LD B,&7F            ; Load Gate array address into B
                            ;  since B is put on the upper 8 Bits of the
                            ;  Address Bus During the OUT (C) instructions
        LD A,(LIMIK)        ; Check No. of inks to be changed
        CP 2                ; If A < 2 change colours the slow way
        JR C,FTFEW          ; Else do the border and the
        LD HL,INKTAB        ;  first two inks as fast as possible
        PUSH AF             ; Save limit of inks to be changed
        LD D,L              ; Load the spare registers with the
        LD E,(HL)           ;  ink numbers and colours of the first
        LD A,(BORCOL)       ;  two inks to be changed and the border
        LD C,&10            ;  which is also changed at this point
        INC HL              ;
        PUSH HL             ; Save ink table pointer
        LD H,(HL)           ;
        OUT (C),D           ; Output the ink Nos. and colours
        OUT (C),E           ;
        OUT (C),C           ; Border No.
        OUT (C),A           ; Border colour
        OUT (C),L           ;
        OUT (C),H           ;
        POP HL              ; Get the ink table pointer
        INC HL              ; Increment it to 2
        POP AF              ; Get the limit of inks
        JR Z,FTPASS         ; If there were exactly 2 inks to change
        JR  FTOUT           ; Else continue outputing inks
;
FTFEW:              ; Entered if 1 or no inks to change
        LD L,&10            ; Set gate address
        OUT (C),L           ;
        LD A,(BORCOL)       ; Get the border colour
        OUT (C),A           ; Send it to Gate Array
        LD HL,INKTAB        ; Get the start of ink the table
        LD A,(LIMIK)        ; Get the number of inks to set
        CP 0                ; Check if no inks to change
        JR Z,FTPASS         ;  ie only the border
        DEC A               ; Decrement the limit as L starts at 0
;
FTOUT:  OUT (C),L           ; Set Gate Array for ink (L)
        OUTI                ; Set its hardware colour
        INC B               ; Reset B
```

gram, the latter of these two must however be of the form &XXOO.

The mechanism by which the screen is split uses two of the interrupt queues, the Frame Flyback Queue and the Fast Ticker Queue. These interrupt queues are again described in the *Firmware Specification Soft 158*. Again briefly these allow the user to write machine code routines which are called not from basic in the normal manner but periodically in a similar manner to the way the Basic Instruction Every works and hence operate without the User needing to be concerned with driving them.

The Frame Flyback interrupts occur as the name suggests every Frame Flyback i.e., 50 Hz in the UK, 60 Hz in various other countries. The Fast Ticker interrupts occur at 300 Hz and so 6 — or 5 if Flyback is at 60 Hz — of these will happen during the period between frame flybacks, unfortunately only three of these happen during the actual display period. The Fast Ticker is used to set the position at which the screen is split and the Frame Flyback used to synchronise the split position with the display.

To use the interrupt queues each routine to be called has to have an event block which is an area of memory reserved by the user which is kicked by the interrupt and in turn calls the routine. These blocks are initialised, put on queues, deleted from the queues, etc using various jump blocks. ■

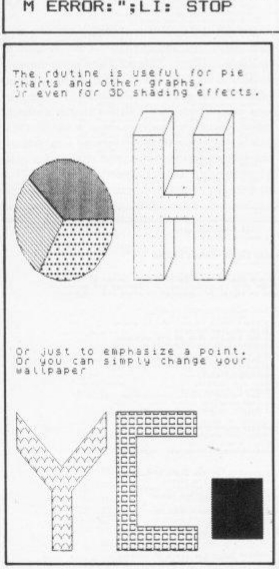
Basic loader.

```
10 REM version 1.1
20 REM Basic loader for SPLIT.
30 REM keep the line numbers as listed
40 REM and then when you make a mistake
50 REM in the data statements the
60 REM program will tell you what line
70 REM it is in.
65 PRINT "To load the code from 24000 onwards":PRINT "
press Enter when the INPUT prompts appear"
70 INPUT"Start of Machine code program":startp
80 IF startp = 0 THEN startp = 24000
90 IF startp  0 THEN startp = startp + 65536
100 INPUT"Start of Variable Area":startd
110 IF startd = 0 THEN startd = 54529
120 IF startd < 0 THEN startd = startd + 65536
130 IF startd<INT ( startd / 256 ) * 256  25 THEN GO
TO 100
140 IF startd<startp AND startd < HIMEM THEN MEMORY st
artd-1 ELSE IF startp<startd AND startp<HIMEM THEN MEM
ORY startp-1
150 address = startp
160 limit = startp + 329
170 datastart = 10000
180 GOSUB 880
190 address = startd
200 limit = startd + 157
210 datastart = 10000
220 GOSUB 880
230 address = startd + 231
240 limit = startd + 248
250 datastart = 10000
260 GOSUB 880
270 FOR n= 1 TO 31:
280   READ address : READ value
290   address = address + 31536 + startp : value = va
lue + startd
300   GOSUB 680
310 NEXT
320 FOR n= 1 TO 10
330   READ address:READ value
340   address = address + 51376 + startp : value = va
lue + startd
350   GOSUB 680
360 NEXT
370 FOR n= 1 TO 4
380   READ address : READ value
390   address = address - 86619 + startp : value = va
lue + startp
400   GOSUB 680
410 NEXT
420 CALL startp
430 :SPLIT:.
440 STOP
490 REM code in new address values
600 FOR address=address-INT( address / 256 ) * 256
620 FOR address = 1, INT( value/256 )
630 RETURN
880 REM read data subroutine
910 start=address : address
920 check = 0
930 FOR n= 1 TO 8
940 READ :POKE address+n,n
950 check = check + n
960 NEXT
970 READ checksum
980 IF check  checksum THEN GOTO 940
990 address = address + 8
700 IF address  limit THEN GOTO 930
910 RETURN
920 REM save exec version
930 SAVE"splitver",b,24000,585
940 REM check sum error
950 linenumber = INT( address - startaddr / 8 ) * 10
960 "datastart"
970 PRINT" data error in line ";
980 PRINT linenumber
990 STOP
990 REM program data
1000 DATA 2,142,134,73,81,134,205,209,4,0,24
1010 DATA 180,201,254,0,32,13,62,4,8,0,91
1020 DATA 58,59,134,62,46,50,60,134,62,0,0
1030 DATA 24,52,254,1,0,0,24,133,254,4,0,79
1040 DATA 6,0,254,1,133,221,134,8,254,5,0,49
1050 DATA 17,56,2,62,1,0,58,58,134,50,58
1060 DATA 221,70,221,35,221,126,0,198,50,62,1
1070 DATA 5,230,7,95,254,7,1,52,0,0,58
1080 DATA 134,126,79,32,1,4,10,58,50,0,187
1090 DATA 68,134,123,58,59,134,33,71,0,0,29
1100 DATA 134,6,229,14,255,17,168,133,126,58
1110 DATA 205,215,188,33,61,134,6,193,5,0,80
1120 DATA 14,255,17,57,133,205,224,188,0,0,45
1130 DATA 201,58,57,134,33,59,134,190,58,0,62
1140 DATA 48,77,58,68,134,71,16,254,0,0,0,0
1150 DATA 6,127,58,58,134,254,2,56,0,0,0,0
1160 DATA 33,33,0,175,245,85,94,58,58,0,0,0
1170 DATA 16,175,14,16,205,229,188,0,0,0,0,0
1180 DATA 81,237,89,237,75,229,121,237,83,0,0
1190 DATA 185,237,91,205,35,241,40,31,0,0,0,0
1200 DATA 24,20,46,16,237,185,58,16,40,0,0,0
1210 DATA 135,237,91,205,35,58,40,0,0,0,0,0
1220 DATA 134,254,0,40,10,61,237,185,58,0,0,0
1230 DATA 237,161,4,184,218,134,33,56,40,0,0,0
1240 DATA 57,174,61,32,2,62,6,58,50,0,0,0
1250 DATA 57,174,62,0,58,62,174,201,40,0,0,0
1260 DATA 205,59,188,205,56,188,62,6,83,0,0,0
1270 DATA 50,57,134,62,0,58,75,134,50,0,0,0
1280 DATA 201,25,61,134,205,224,188,62,0,0,0,0
1290 DATA 71,134,205,221,188,201,254,2,0,0,0,0
1300 DATA 32,57,221,126,,13,0,135,40,0,0,0
1310 DATA 254,16,48,56,0,0,79,9,50,0,0,0
1320 DATA 221,126,0,254,20,210,0,134,58,0,0,0
1330 DATA 17,25,134,121,95,40,1,20,60,0,0,0
1340 DATA 26,119,201,254,1,194,251,157,58,49,0
1350 DATA 125,254,20,210,0,134,1,25,0,0,0,0
1360 DATA 174,121,95,40,1,20,26,58,0,0,0,0
1370 DATA 16,135,201,157,85,134,6,28,0,0,7E
1380 DATA 205,61,134,201,254,1,40,0,0,0,47
1390 DATA 29,205,15,134,201,126,35,197,58,0,0
1400 DATA 229,205,57,134,201,197,229,245,0,0,71
1410 DATA 201,0,0,0,0,0,0,0,0,0,0,0,09
1900 REM  variables and tables data
2000 DATA 84,ed,80,0,0,0,0,0,76,ed,84,0,0,0,0
2010 DATA 77,8e,70,07,94,e4,95,70,0,0,0,0
2020 DATA 71,79,0C,ee,80,90,89,94,0,0,0,0
2030 DATA 74,e7,75,118,4e,118,4e,227,N0CFD
2040 DATA e,0,0,0,F0,0,0,0,0,0,0,0
2050 DATA 0,0,0,0,0,0,0,0,0,0,0,0
2060 DATA 0,0,0,0,0,0,0,0,0,0,0,0
2070 DATA 0,0,0,0,00,e5,02,e5,N0124
2080 DATA 77,e9,94,e5,80,32,67,79,N002F
2090 DATA 85,78,84,32,69,82,82,79,N004F
2100 DATA 80,75,77,78,32,82,85,88,N006A
2110 DATA 80,65,82,65,77,e9,84,e9,N006F
2120 DATA 82,32,79,85,84,32,79,78,N021F
2130 DATA 32,82,65,78,71,e9,32,75,N0E8
2140 DATA 78,32,82,65,88,15e,154,195,N0E5
2150 DATA 219,172,195,177,173,195,190,157,N055D
2160 DATA 195,227,133,83,80,76,73,212,N0437
2170 DATA 83,77,84,79,70,190,N0C2E
2180 DATA 76,79,73,78,32,76,79,ee,N0DN
2190 DATA 79,82,ee,0,0,0,0,0,0,0,0,0,N01FC
2990 REM RSX routine address data
3000 DATA 5,ed,1,ed,84,ed,ed,0,70,N0D7A
3010 DATA 74,e8,76,81,75,74,76,77,N0D5E
3020 DATA 74,0,0,0,0,0,0,0,0,0,N0D4A
3990 REM address address data
4000 DATA 58401,117,16404, 56,16401, 74
4010 DATA 58416, 75,16404, 76,16407, 77
4020 DATA 16519, 35,16516, 34,16517, 46
4030 DATA 16520, 56,16518, 57,16519, 54
4040 DATA 16543, 35,16548, 37,16552,251
4050 DATA 16550,241,16553, 0,16557, 0
4060 DATA 16579, 35,16586,101,16590, 32
4070 DATA 16596, 52,16598, 40,16599, 32
4080 DATA 16594, 50,16582, 76,16588, 46
4090 DATA 16556,211,16560, 0,16562, 0
4100 DATA 16578,247,16591, 60,16645, 88
4110 DATA 16482, 50,16487,249,16526,200
4130 DATA 16533,205,16506,200,16506,200
4140 DATA 16521,N0A,16601,117,16606,117
4150 DATA 16580,192                    *
4200 DATA 16673,128,16694,235,16651, 10
4210 DATA 16614,205
10000 :SPLIT:.4
```

```
                CP L                    ; Check if this is the last ink to be set
                JP NC,FTOUT             ; If not continue outputing
;
;
FTPASS: LD A,(PCOUNT)                   ; Get the position counter
        DEC A                           ; And decrement it
        JR NZ, FTNST                    ; If it decrements to zero
        LD A,6                          ; Reset it to 6
FTNST:  LD (PCOUNT),A                   ; And store it again
;
        LD A,0                          ; Reset the Fast Ticker block counter
        LD (FTBLK+4),A                  ;
        RET                             ; Return to basic
;
                        FRAME FLYBACK ROUTINE
                        ---------------------
;
;
; This routine is called every 20 mS. It Synchronises the Split position with
; the Frame Flyback. It also resets the pallette at the frame top
;
FRRTN:  CALL &BC39                      ; Get border colour
        CALL &BC38                      ; Set border colour
        LD A,6                          ; Reset position counter
        LD (PCOUNT),A                   ;
        LD A,0                          ; Reset the Frame Flyback block counter
        LD (FRBLK+4),A                  ;
        RET                             ; Return to basic
;
                        SPLITOFF COMMAND ROUTINE
                        ------------------------
;
; This routine is called when the RSX command SPLITOFF is  found. It resets the
; screen to the normal format.  The Fast Ticker and Frame Flyback Blocks are
; removed from their respective queues.
;
OFF:    LD HL,FTBLK                     ; Remove fast ticker block
        CALL &BCEA                      ; KL DEL FAST TICKER
        LD HL,FRBLK                     ; Remove Frame Flyback block
        CALL &BCDD                      ; KL DEL FRAME FLY
        RET                             ; Return to basic
;
                        LOINK COMMAND ROUTINE
                        ---------------------
;
; This routine is called when the RSX command LOINK,n,m is found. It changes the
; colour associated with ink number 'n' to colour 'm'. It requires two
; parameters, and if the correct number of parameters are not passed then it
; exits via the error routine.
;
LOINK:  CP 2                            ; Check for two parameters
        JR NZ,PCERR                     ;
        LD A,(IX+2)                     ; Get the Ink number
        LD HL,INKTAB                    ; Get the table start
        CP 16                           ; Check that the ink number is
        JR NC,PRERR                     ;  in range 0 - 15
        LD B,0                          ;
        LD C,A                          ;
        ADD HL,BC                       ; Add offset in table
        LD A,(IX)                       ; Get the Ink colour
        CP 28                           ; Check if it is in range
        JP NC,PRERR                     ;
        LD DE,COLTABL                   ; Get the start of the Hardware colour table
        ADD A,E                         ; Add the colour offset ( ADD DE,A )
        LD E,A                          ;
        JR NC,LDI                       ;
        INC D                           ;
LDI:    LD A,(DE)                       ; Get Hardware colour number
        LD (HL),A                       ; Load into ink table
LDEND:  RET                             ; Return to basic
;
                        BORDER COLOUR COMMAND ROUTINE
                        -----------------------------
;
; This routine is called when the RSX command LOBORDER,m is found. It changes
; the colour of the lower border area to colour 'm'. It requires one parameter,
; and if more or less than one parameter is past then it exits via the Error
; routine.
;
BORDER:
                        CP 1                    ; Check there is only one Parameter
                        JP NZ,PCERR             ; If not jump to error
                        LD A,E                  ; Get the Low Byte of the parameter
                        CP 28                   ; Check that the colour is in range
                        JP NC,PRERR             ;
                        LD DE,COLTABL           ; Get the start of the colour lookup table
                        ADD A,E                 ; Add the parameter as an offset
                        LD E,A                  ; ( ADD DE,A )
                        JR NC,BOI               ;
                        INC D                   ;
BOI:    LD A,(DE)       ; Get Hardware colour number from the table
        LD (BORCOL),A   ; Load into ink colour into variable
        RET             ; Return to Basic
;
                        PARAMETER COUNT ERROR ROUTINE
                        -----------------------------
;
; This routine is entered if the parameter count was incorrect.
;
PCERR:  LD HL,PCMES     ; Point HL at the start of message
        LD B,28         ; Load B with its length
        CALL PRINTMES   ; Call message printing routine
        RET             ; ( uses the current window )
;
                        PARAMETER RANGE ERROR ROUTINE
                        -----------------------------
;
; This routine is entered if the parameter was out of range.
;
PRERR:  LD HL,PRMES     ; Point HL at the start of message
        LD B,28         ; Load B with its length
        CALL PRINTMES   ; Call message printing routine
        RET             ; ( uses the current window )
;
EXIT:   RET             ; Return to basic
;
                        PRINT MESSAGE SUBROUTINE
                        ------------------------
;
; This routine should be entered with the address of the start of the string
; in HL and the length of it in B. It prints the string, printing not obeying
; control codes in the current window.
;
PRINTMES:
        LD A,(HL)       ; Get a character
        INC HL          ; Point at the next
        PUSH BC         ; Save counter
        PUSH HL         ; Save pointer
        CALL &BB5D      ; TXT WR CHAR
        POP HL          ; Recover pointer
        POP BC          ; Recover counter
        DJNZ PRINTMES   ; Are there any more to print
        RET             ;
```

Listing 2.

```
   1 DEF FN i(h$)=CODE h$-48-7*(h
$>"9")
   2 DEF FN h(b$)=16*FN i(b$(1))+
FN i(b$(2))
   3 RESTORE 100
   4 LET LI=110
   5 READ ADD
   6 LET C=0: READ A$,CH
   7 IF a$(1)="Z" THEN PRINT "POK
ING COMPLETE. SAVE CODE NOW!": GO
 TO 20000
   8 IF LEN A$<>16 THEN PRINT "LI
NE LENGHT WRONG:";LI: STOP
   9 FOR K=0 TO 7
  10 LET B$=A$( TO 2)
  11 LET A$=A$(3 TO )
  12 LET B=FN H(B$)
  13 POKE ADD,B
  14 LET C=C+PEEK ADD
  15 LET ADD=ADD+1
  16 NEXT K
  17 IF C<>CH THEN PRINT "CHECKSU
M ERROR:";LI: STOP
  18 GO TO 6
  97 REM **********************
       * PLACE START ADDRESS *
     * AT LINE 100 FOLLOWED*
   * BY DATA ENDING WITH *
  * DATA "Z",0          *
 **********************
 100 DATA 64800
 110 DATA "F3C3CAFD03E500C5",1322
 120 DATA "3EAF9030043E01C1",689
 130 DATA "C9E5CDCE22CDA22D",1287
 140 DATA "E179C1C9C53EAF90",1318
 150 DATA "30043E00C1C94759",668
 160 DATA "480600CB21CB10CB",736
 170 DATA "21CB10CB21CB10CB",910
 180 DATA "21CB10CB21CB107B",830
 190 DATA "CB3BCB3BCB3B1600",808
 200 DATA "2A24FD1909CB23CB",806
 210 DATA "23CB23C17993C601",933
 220 DATA "C9477ECB2710FC38",964
 230 DATA "033E00C93E01C947",601
 240 DATA "3E00371F10FDB677",718
 250 DATA "C9C5E5D5CD3CFDFE",1612
 260 DATA "002004D1E1C1C9CD",1069
```



THESE TWO machine-code routines provide your 48K Spectrum with a way of filling in the screen without all the problems of attributes, i.e. colours overlapping. This is achieved by filling in the required area with a set pixel pattern, set up by the user in the first user-defined graphic.

The main dollop of machine code is in fact a common garden fill routine, this particular one by N. Dore — *Your Computer* October 1983. The program first fills in the required area in the usual way, then hatches it.

To type in the machine code, first type in listing 1. Type Run and the computer will check the data for any errors. After correcting any of these errors, save the program to tape or Microdrive with:

SAVE "HATCH DATA"

or

SAVE *"m";1;"HATCH DATA"

Now save the code with

SAVE "HATCH" CODE 58000,70

or

SAVE *"m";1;"HATCH" CODE 58000,70

It is probably best to save the code on a different tape from the data programs. Next comes the fill routine. Type

CLEAR 57999

then type in listing 2 and Run it, correcting any errors. Then save it with

SAVE "FILL DATA"

or

SAVE *"m";1;"FILL DATA"

The reason for saving the data programs as well as the code is that checksums do not detect all

HAT

errors. Now save the actual code using

SAVE "FILL" CODE 64800,500

or

SAVE *"m";1;"FILL" CODE 64800,500

Now the code is ready to run. Listing 3 demonstrates some of the possibilities of this routine. How to use this routine is probably best learned by studying this program but here is an example of step by step hatching.

1. Create shape to be filled on screen, making sure there are no gaps along the edges.
2. Define the first UDG (see listing 4 or manual).
3. Choose any point inside the shape and type

PLOT INVERSE 1;x,y

where x,y is the chosen point.

4. Type

RANDOMIZE USR 64800

and the area will fill with ink.

5. Type

RANDOMIZE USR 58000

and the area filled will become hatched.

6. If you don't like the pattern, then type

RANDOMIZE USR 58000

redefine the UDG and retype

RANDOMIZE USR 58000

Listing 1.

```
   1 DEF FN i(h$)=CODE h$-48-7*(h
$>"9")
   2 DEF FN h(b$)=16*FN i(b$(1))+
FN i(b$(2))
   3 RESTORE 100
   4 LET LI=110
   5 READ ADD
   6 LET C=0: READ A$,CH
   7 IF a$(1)="Z" THEN PRINT "POK
ING COMPLETE. SAVE CODE NOW!": GO
 TO 20000
   8 IF LEN A$<>16 THEN PRINT "LI
NE LENGHT WRONG:";LI: STOP
   9 FOR K=0 TO 7
  10 LET B$=A$( TO 2)
  11 LET A$=A$(3 TO )
  12 LET B=FN H(B$)
  13 POKE ADD,B
  14 LET C=C+PEEK ADD
  15 LET ADD=ADD+1
  16 NEXT K
  17 IF C<>CH THEN PRINT "CHECKSU
M ERROR:";LI: STOP
  18 GO TO 6
  97 REM **********************
       * PLACE START ADDRESS *
     * AT LINE 100 FOLLOWED*
   * BY DATA ENDING WITH *
  * DATA "Z",0          *
 **********************
 100 DATA 58000
 110 DATA "86AF1103E52A7B5C",687
 120 DATA "7BE607EE07C54F06",884
 130 DATA "0009C1CDA8E210ED",1054
 140 DATA "0E00CDB5E21379C6",964
 150 DATA "004F30F6C9D5E5C5",1221
 160 DATA "E5CDAA221A46A8E1",1127
 170 DATA "4F7E471A0B157C1",919
 180 DATA "C5CDAA2272C1E1D1",1347
 190 DATA "C900000000000000",201
 200 DATA "Z",0
```

```
270 DATA "79FDD1E1C1C9C5E5",1628
280 DATA "D5CD3CFDFE002004",1021
290 DATA "D1E1C1C9CD87FDD1",1630
300 DATA "E1C1C9C5F53EAF90",1442
310 DATA "3805E5CDDF22E1F1",1218
320 DATA "C1C92A24FD010016",748
330 DATA "3600230B78B1FE00",651
340 DATA "20F62A7D5CE5444D",911
350 DATA "0CCD27FDFE00200A",805
360 DATA "CDBBFDCDA6FD18F0",1533
370 DATA "0000E1444D0DCD27",627
380 DATA "FDFE002008CDBBFD",1192
390 DATA "CDA6FD18F03E0032",1000
400 DATA "815C2A24FD0100AF",728
410 DATA "7EFE00C479FE2379",1107
420 DATA "C608FE002001054F",577
430 DATA "3EFFB8287A18E9CD",1125
440 DATA "91FDFE00CB04CD27",1100
450 DATA "FDFE00CC8DFE050C",1123
460 DATA "CD27FDFE00CC8DFE",1350
470 DATA "0D05CD27FDFE00CC",973
480 DATA "8DFE040DCD27FDFE",1163
490 DATA "00CC8DFE0CC9E511",1058
500 DATA "2000237ECB7FE1C8",948
510 DATA "E52B7ECB47E1C8E5",1326
520 DATA "197EFEFFE1C0E5A7",1473
530 DATA "ED527EFEFFE1C0D1",1580
540 DATA "C9CD56FEC51E00D5",1186
550 DATA "CD27FED10C1C3E08",817
560 DATA "BB20F4C1C9CD91FD",1460
570 DATA "FE01C8CDA6FDCDBB",1471
580 DATA "FD3E0132815CC93A",846
590 DATA "815CFE00CAECFE3E",1229
600 DATA "0032815C2A24FD11",619
610 DATA "FF151901FF007EFE",937
620 DATA "00C4CDFE2B79D608",1041
630 DATA "FEFF2001044F3EB0",863
640 DATA "B8281618E9CD56FE",1048
650 DATA "C51E00D5CD27FED1",1147
660 DATA "0D1C3E08BB20F4C1",767
670 DATA "C93A815CFE00CAEC",1172
680 DATA "FEC305FE2A24FD11",1056
690 DATA "0000010016 7EC506",352
700 DATA "08CB273001131 0F9",583
710 DATA "C10B2378B1FE0020",822
720 DATA "EC424BFBC9000000",829
730 DATA "0000000000000000",0
740 DATA "Z",0
```

CHED FILL

A J Renton makes it easy to fill the Spectrum screen with patterns.

7. If you wish to remove all of the filled area, using

RANDOMIZE USR 58000

revert the hatch pattern to its original all filled in position, define the UDG as totally blank and type

RANDOMIZE USR 58000

Hey presto! the filled area disappears.

A final warning: before loading the fill routine, always type

CLEAR 57999

or the computer is likely to crash.

Listing 4.

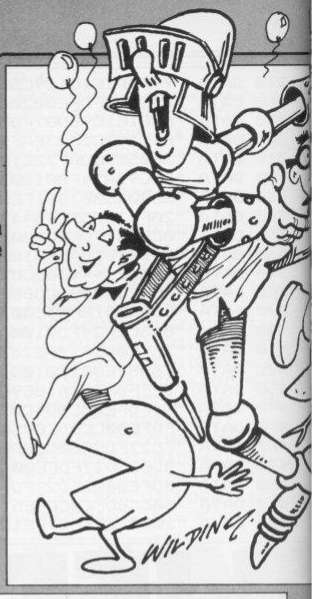
```
 10 REM UDG data poke
 program
 20
 30 RESTORE 100
 40 FOR k=USR "a" TO
USR "a"+7
 50 READ byte
 60 POKE k,byte
 70 NEXT k
 80 PRINT "A": REM Gr
aphics A
100 DATA BIN 10001000
101 DATA BIN 01000100
102 DATA BIN 00100010
103 DATA BIN 00010001
104 DATA BIN 10001000
105 DATA BIN 01000100
106 DATA BIN 00100010
107 DATA BIN 00010001
```

Listing 3.

```
 10 REM Hatch demo
 15
 20 REM by A.Renton 1985
 25
 30 LET poke=9000
 40 LET fill=64800
 50 LET hatch=58000
 60 PAPER 7: INK 0: BRIGHT 0: FLASH 0:
OVER 0: INVERSE 0: CLS
 70 BORDER 7
 80 PRINT "The routine is useful for pi
e  charts and other graphs."
 90 CIRCLE 50,50,50
100 PLOT 50,50: DRAW 50,0
110 PLOT 50,50: DRAW -35,35
120 PLOT 50,50: DRAW -25,-43
130 PLOT INVERSE 1;60,60: RANDOMIZE USR
fill
140 DATA 170,85,170,85,170,85,170,85: G
O SUB poke
150 RANDOMIZE USR hatch
160 PLOT INVERSE 1;40,40: RANDOMIZE USR
fill
170 DATA BIN 10001000,BIN 1000100,BIN 1
00010,BIN 10001,BIN 10001000,BIN 1000100
,BIN 100010,BIN 10001: GO SUB poke
180 RANDOMIZE USR hatch
190 PLOT INVERSE 1;60,40: RANDOMIZE USR
fill
200 DATA BIN 0,BIN 01100110,BIN 0110011
0,BIN 0,BIN 0,BIN 11000,BIN 11000,BIN 0
210 GO SUB poke: RANDOMIZE USR hatch
220 PRINT "Or even for 3D shading effec
ts."
230 PLOT 150,0: DRAW 0,50: DRAW 30,0: D
RAW 0,-50: DRAW 30,0: DRAW 0,120: DRAW -
30,0: DRAW 0,-50: DRAW -30,0: DRAW 0,50:
 DRAW -30,0: DRAW 0,-120: DRAW 30,0
240 DRAW 10,20: DRAW 0,20: DRAW 0,10
250 PLOT 150,70: DRAW 10,20: DRAW 20,0:
 PLOT 160,90: DRAW 0,50: DRAW -30,0: DRA
W -10,-20: DRAW 30,0: DRAW 10,20
260 PLOT 210,0: DRAW 10,20: DRAW 0,120:
 DRAW -10,-20: DRAW -30,0: DRAW 10,20: D
RAW 30,0
270 PLOT INVERSE 1;131,1: RANDOMIZE USR
fill
280 DATA 0,0,0,16,0,0,0,0: GO SUB poke:
 RANDOMIZE USR hatch
290 PLOT INVERSE 1;130,122: RANDOMIZE U
SR fill
300 DATA 0,255,0,255,0,255,0,255
310 GO SUB poke: RANDOMIZE USR hatch
320 PLOT INVERSE 1;190,122: RANDOMIZE U
SR fill: RANDOMIZE USR hatch
325 PLOT INVERSE 1;160,80: RANDOMIZE US
R fill: RANDOMIZE USR hatch
330 PLOT INVERSE 1;152,20: RANDOMIZE US
R fill
340 DATA BIN 11011101,BIN 11101110,BIN
11101111,BIN 10111011,BIN 11011101,BIN 1
101110,BIN 11101111,BIN 10111011
350 GO SUB poke: RANDOMIZE USR hatch
360 PLOT INVERSE 1,212,20: RANDOMIZE US
R fill: RANDOMIZE USR hatch
370 PLOT INVERSE 1;152,90: RANDOMIZE US
R fill: RANDOMIZE USR hatch
380 PAUSE 20: PAPER 0: INK 6: BRIGHT 1:
 CLS
390 PRINT "Or just to emphasize a point
-"
400 PLOT 35,0: DRAW 0,50: DRAW -35,35:
DRAW 0,30: DRAW 45,-45: DRAW 45,45: DRAW
0,-30: DRAW -35,-35: DRAW 0,-50: DRAW -
20,0
410 PLOT INVERSE 1;40,1: RANDOMIZE USR
fill
420 DATA 0,BIN 100000l,BIN 100010,BIN 1
0100,BIN 1000,BIN 1000,0,0
430 GO SUB poke: RANDOMIZE USR hatch
440 PLOT 100,0: DRAW 0,115: DRAW 80,0:
DRAW 0,-20: DRAW -60,0: DRAW 0,-75: DRAW
 60,0: DRAW 0,-20: DRAW -80,0
450 PLOT 179,1: INK 4: RANDOMIZE USR fi
ll
460 DATA 0,126,66,64,64,66,126,0
470 GO SUB poke: RANDOMIZE USR hatch
480 PRINT "Or you can simply change you
r  wallpaper"
490 PLOT 195,10: DRAW 50,0: DRAW 0,50:
DRAW -50,0: DRAW 0,-50
500 PLOT INVERSE 1;220,20: PAPER 5: INK
0: BRIGHT 1: RANDOMIZE USR fill
510 POKE 23676,62: FOR a=1 TO 26: POKE
23675,a*8: RANDOMIZE USR hatch: PAUSE 1:
 RANDOMIZE USR hatch: IF CODE INKEY$ THE
N GO TO 520
515 NEXT a: GO TO 510
520 POKE 23676,255: POKE 23675,88
8999 STOP
9000 FOR k=USR "a" TO USR "a"+7: READ a:
 POKE k,a: NEXT k
9010 RETURN
```

CBM-64 SPRITES

Nalin Sharma with a routine for special effects.



RASTER INTERRUPTS are one of the most important aspects of machine-code programming on the Commodore 64. They allow such things as smooth scrolling and split screen effects, both of which I have used in previous *Your Computer* programs.

However, one of the most striking illustrations of raster interrupts is to have more than eight sprites on the screen at once. This was hinted at in the programmers' reference guide, but there was no full explanation, and so here is a program which will display 64 sprites on your CBM-64.

The screen display of the CBM-64 is made up of 200 horizontal lines and is updated roughly every 1/60th of a second. The screen

Listing 1.

```
1 REM********BASIC LOADER FOR 64 SPRITES********
2 REM********COPYRIGHT 1985 NALIN SHARMA********
5 CH=34868:SM=5119:SUMCD=0:SPRCD=0
10 FOR=49152TO49445
20 READ:POKE.,B:SUMCD=SUMCD+B
30 NEXT
40 IF SUMCD<>3MTHENPRINT"DATA ERROR":STOP
50 FOR=8192TO9384
60 READ:POKE.,A:SPRCD=SPRCD+A
70 NEXT
80 IF SPRCD<>3MTHENPRINT"DATA ERROR":STOP
100 SYS49152
200 PRINT"■■■TAB(30)"64 SPRITES"
210 PRINTTAB(30)"(C) NALIN"
220 PRINTTAB(30)"   SHARMA■"
1000 DATA 169, 147, 32, 210, 255, 32
1010 DATA 199, 192, 32, 12, 192, 96
1020 DATA 120, 169, 58, 141, 20, 3
1030 DATA 169, 192, 141, 21, 3, 169
1040 DATA 0, 141, 64, 3, 169, 1
1050 DATA 141, 26, 208, 173, 17, 208
1060 DATA 41, 127, 141, 17, 208, 169
1070 DATA 49, 141, 19, 208, 169, 255
1080 DATA 141, 25, 208, 169, 0, 141
1090 DATA 14, 220, 88, 96, 174, 64
1100 DATA 3, 160, 1, 189, 1, 193
1110 DATA 153, 0, 208, 200, 200, 192
1120 DATA 17, 208, 247, 169, 129, 141
1130 DATA 25, 208, 173, 17, 208, 41
1140 DATA 127, 141, 17, 208, 230, 64
1150 DATA 3, 174, 64, 3, 224, 9
1160 DATA 208, 5, 162, 0, 142, 64
1170 DATA 3, 189, 9, 193, 141, 18
1180 DATA 208, 224, 0, 208, 80, 230
1190 DATA 65, 3, 173, 65, 3, 201
1200 DATA 7, 208, 49, 169, 0, 141
1210 DATA 65, 3, 230, 66, 3, 173
1220 DATA 66, 3, 41, 3, 141, 66
1230 DATA 3, 174, 66, 3, 189, 33
1240 DATA 193, 141, 249, 7, 141, 249
1250 DATA 7, 141, 250, 7, 141, 251
1260 DATA 7, 141, 252, 7, 141, 253
1270 DATA 7, 141, 254, 7, 141, 255
1280 DATA 7, 32, 175, 192, 76, 49
1290 DATA 234, 162, 0, 222, 0, 208
1300 DATA 222, 0, 208, 222, 0, 208
1310 DATA 232, 232, 224, 16, 208, 241
1320 DATA 96, 104, 169, 104, 170, 104
1330 DATA 64, 169, 255, 141, 21, 208
1340 DATA 169, 0, 141, 63, 3, 141
1350 DATA 66, 3, 141, 65, 3, 141
1360 DATA 16, 208, 162, 0, 160, 0
1370 DATA 189, 17, 193, 153, 0, 208
1380 DATA 189, 128, 157, 248, 7, 189
1390 DATA 25, 193, 157, 39, 208, 200
1400 DATA 200, 232, 224, 8, 208, 232
1410 DATA 169, 1, 141, 33, 208, 169
1420 DATA 6, 141, 32, 208, 96, 51
1430 DATA 75, 99, 123, 147, 171, 195
1440 DATA 219, 40, 71, 95, 119, 143
1450 DATA 167, 191, 215, 30, 60, 90
1460 DATA 120, 150, 180, 210, 240, 0
1470 DATA 2, 4, 5, 6, 11, 9
1480 DATA 14, 130, 129, 128, 129, 0
1000 DATA 0, 24, 0, 0, 60, 0
1010 DATA 0, 60, 0, 0, 24, 0
1020 DATA 2, 15, 128, 3, 31, 224
1030 DATA 1, 190, 40, 0, 254, 96
1040 DATA 0, 14, 64, 0, 14, 0
1050 DATA 0, 14, 0, 0, 29, 0
1060 DATA 0, 59, 128, 0, 97, 128
1070 DATA 0, 96, 192, 0, 192, 124
1080 DATA 0, 192, 4, 0, 64, 0
1090 DATA 0, 64, 0, 0, 192, 0
1100 DATA 0, 0, 0, 0, 0, 24
1110 DATA 0, 0, 60, 0, 0, 60
1120 DATA 0, 0, 24, 0, 0, 12
1130 DATA 0, 0, 31, 0, 0, 31
1140 DATA 128, 0, 62, 128, 1, 238
1150 DATA 128, 0, 207, 0, 0, 14
1160 DATA 0, 0, 30, 0, 0, 30
1170 DATA 0, 0, 30, 0, 0, 51
1180 DATA 0, 0, 49, 192, 0, 49
1190 DATA 32, 0, 16, 96, 0, 16
1200 DATA 0, 0, 32, 0, 0, 0
1210 DATA 0, 0, 0, 24, 0, 0
1220 DATA 60, 0, 0, 60, 0, 0
1230 DATA 24, 0, 0, 12, 0, 0
1240 DATA 30, 0, 0, 26, 0, 0
1250 DATA 26, 0, 0, 26, 0, 0
1260 DATA 26, 0, 0, 26, 0, 0
1270 DATA 22, 0, 0, 14, 0, 0
1280 DATA 30, 0, 0, 12, 0, 0
1290 DATA 12, 0, 0, 12, 0, 0
1300 DATA 12, 0, 0, 28, 0, 0
1310 DATA 12, 0, 0, 28, 0, 0
1320 DATA 0, 24, 0, 0, 60, 0
```

Listing 2.

```
  10 **$C000 !MULTIPLEXED SPRITES COPYRIGHT 1985 NALIN SHARMA
  50 VIC          =  53248
  51 HRAST        =  VIC+17
  52 RAST         =  VIC+18
  53 IRST         =  VIC+25
  54 ERST         =  VIC+26
  55 XSCL         =  VIC+22
 880 VB           =  830
 890 HIND         =  VB+1                  !SPRITE MOVEMENT INDEX
 900 RASNUM       =  VB+2                  !INTERRUPT NUMBER
 905 SPD          =  VB+3                  !ANIMATION SPEED
 906 SPIND        =  VB+4                  !SPRITE NUMBER INDEX
 907 SPRITESON    =  VIC+21
 908 MSBX         =  VIC+16
 910 BORDER       =  53280
 915 BACKGR       =  53281
1000 !
1010 !
1020 !
1070 START       LDA #147
1080             JSR $FFD2                !CLEAR SCREEN
1085             JSR SETSPRITES           !SET UP VIC CHIP
1090             JSR NEWINT               ! SET NEW INTERRUPTS
1190             RTS                      !RETURN TO BASIC
1216 NEWINT      SEI
1220             LDA #<STINT              !LOW BYTE INTERRUPT POINTER
1230             STA $0314
1232             LDA #>STINT              !HIGH BYTE
1234             STA $0315
1258             LDA #0                   !NUMBER OF  INTERRUPT
1260             STA RASNUM
1262             LDA #1                   !ALLOW INTERRUPTS TO BE CAUSED BY R
ASTER
1263             STA ERST
1264             LDA HRAST                !HIGH BIT RASTER LINE
1265             AND #127
1266             STA HRAST
1267             LDA #49                  !LOW BYTE RASTER LINE
1268             STA RAST
1269             LDA #255
1270             STA IRST                 !CLEAR RASTER LATCH
1272             LDA #0
1274             STA 56334                !CBM INTERRUPTS OFF
1277             CLI                      !READY TO BEGIN
```

(continued on opposite page)

is updated by an "invisible" horizontal line called a raster which runs from top to bottom of the video display.

So say, for example, you had all eight sprites at the top of the screen, you could interrupt the raster once it had drawn all eight sprites. Then you could change the Y position of all eight sprites to the bottom of the screen, so that when the raster reaches the bottom part of the screen it will draw all eight sprites again, thinking it hasn't drawn any sprites yet — see figure 1.

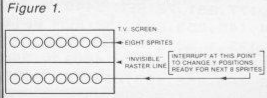
The process I have just described can be tightened up to interrupt at eight different parts of the screen, each time changing the Y position of the sprites — thereby giving 64 sprites.

Listing 1 is the Basic loader for the machine code program which shows 64 men running from right to left. Make sure you save the program before running it.

Listing 2 is the fully assembly listing of the program which is actually quite short. The complete program takes up less than 500 bytes, and that includes data for three sprites. Also, it shouldn't take much trouble to extend the program to a very simple Space Invaders program which shouldn't take up more than about 2K.

One last point is that since the program operates under interrupt control you have all the features of Basic at your disposal. It does make a very strange spectacle watching your program list upwards while 64 men are running across the screen. ■

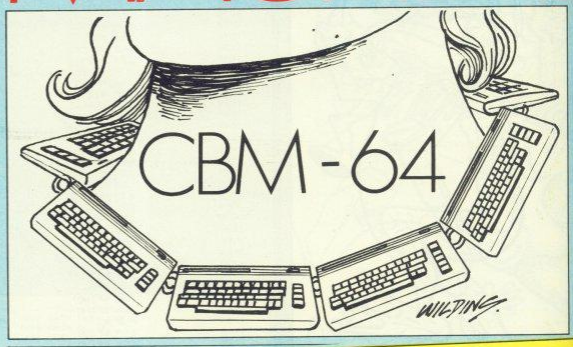
Figure 1.



(listing 2 continued from opposite page)

```
1290                RTS
1300 !
1310 !
1320 !
1500 STINT          LDX RASNUM                  !START INTERRUPTS
1510                LDY #1
1520                LDA SPRITEVERT,X            !SPRITE-Y-POSITION
1530 PLACEY         STA VIC,Y
1532                INY
1534                INY
1540                CPY #17
1550                BNE PLACEY
1600                LDA #129
1610                STA IRST                    !CLEAR LATCH
1620                LDA HRAST
1630                AND #127
1640                STA HRAST
1641                INC RASNUM                  !SET UP FOR NEXT INTERRUPT
1642                LDX RASNUM
1644                CPX #8
1646                BNE NXLN
1647                LDX #0                      !RESET EVERY EIGTH INTERRUPT
1648                STX RASNUM
1650 NXLN           LDA RASLINE,X               !NEXT RASTER LINE
1660                STA RAST
1664                CPX #0
1670                BNE RETFROMINT
1680                INC SPD                     !DO ANIMATION OF ALL 64 MEN
1682                LDA SPD
1684                CMP #7
1686                BNE GOBACK
1690                LDA #0
1692                STA SPD
1700                INC SPIND
1704                LDA SPIND
1706                AND #3
1708                STA SPIND
1710                LDX SPIND
1740                LDA SPRPT,X
1750                STA 2040
1760                STA 2041
1770                STA 2042
1780                STA 2043
1790                STA 2044
1800                STA 2045
1810                STA 2046
1820                STA 2047
1822                JSR LEFT
1830 GOBACK         JMP $EA31                   !SERVICE CBM INTERRUPTS EVERY EIGTH
INTERRUPT
1870 LEFT           LDX #0
1872 LOOPLEFT       DEC VIC,X
1873                DEC VIC,X
1874                DEC VIC,X
1876                INX
1877                INX
1878                CPX #16
1879                BNE LOOPLEFT
1880                RTS
2070 RETFROMINT     PLA                         !PROCEDURE FOR RETURNING FROM THE O
THER 7 INTERRUPTS
2080                TAY
2090                PLA
2100                TAX
2110                PLA
2120                RTI
3000 !
3010 !
3020 !
5000 SETSPRITES     LDA #255
5010                STA SPRITESON
5020                LDA #0
5022                STA HIND
5024                STA SPIND                   !RESET SPEED & SPRITE INDEX OF MAN
5026                STA SPD
5030                STA MRAX
5040                LDX #0
5045                LDY #0
5050 PLACEX         LDA SPRITEHORZ,X
5060                STA VIC,Y                   !SPRITE-X-POSITION
5062                LDA #128
5064                STA 2040,X                  !SPRITE POINTERS
5066                LDA SPRITECOL,X
5068                STA 53287,X                 !SPRITE COLOURS
5070                INY
5080                INY
5090                INX
5100                CPX #8
5110                BNE PLACEX
5200                LDA #1
5210                STA BACKGR                  !WHITE SCREEN
5220                LDA #6
5230                STA BORDER                  !BLUE BORDER
5500                RTS
9000 SPRITEVERT     BYT 51,75,99,123,147,171,195,219
9010 RASLINE        BYT 48,71,95,119,143,167,191,215
9020 SPRITEHORZ     BYT 30,60,90,120,150,180,210,240
9030 SPRITECOL      BYT 0,2,4,5,6,11,9,14
9090 SPRPT          BYT 130,129,128,129
```

MACHINE



ONE OF THE features that most people miss when programming in machine code is strings. This program provides the machine-code programmer with a number of sub-routines to manipulate strings. It will then be possible to write educational programs, quizzes, etc. in machine-code with very little difficulty.

Up to 64 strings are available, numbered in hex from 00 to 3F. These are stored in the area of memory under the Basic Rom — $A000-$BFFF. The sub-routines are situated in memory between $C000 & $C300. They are in a form very similar to the kernal sub-routines and are used in the way way.

The new sub-routines are:

INPUT. Address $C1FA: This sub-routine receives information from the keyboard and stores it in the string specified by the accumulator. For example,

```
LDA #$09
JSR $C1FA
```

The information will be stored in string number 9.

PRINT. Address $C1FD: This sub-routine will display on the screen, at the current cursor position, the contents of the string specified by the accumulator. For example,

```
LDA #$05
JSR $C1FD
```

This will print string number 5.

CLEAR. Address $C200: This sub-routine will clear all characters from the string specified by the accumulator. For example,

```
LDA #$20
JSR $C200
```

This will clear string 32 (Hex 20).

CLEARALL. Address $C203: This clears all 64 strings and requires no registers to be set. This sub-routine should be called before using the strings to make sure that they are ready for use. For example,

```
JSR $C203
```

MEM→STRING. Address $C206: This sub-routine transfers information from the address specified in the X and Y registers to the string specified by the accumulator. The X register contains the least significant byte and the Y register the most significant byte. For example,

```
LDA #$01
LDX #$50
LDY #$80
JSR $C206
```

The above example transfers information from the address $8050 to string number 1. The first 125 bytes of information are transferred unless a 0 (Zero) is encountered which indicates the end of a string.

STRING→MEM. Address $C209: This performs the exact opposite function of the previous routine. This transfers the information in the string indicated by the accumulator to the address specified by the X and Y registers. The X register contains the LSB and the Y register the MSB. For example,

```
LDA #$01
LDX #$50
LDY #$80
JSR $C209
```

This. transfers the information in string number 1 to address $8050.

SWAP. Address $C20C: This sub-routine

```
0 REM ******************************
1 REM *RUN TO TRANSFER SUB'S TO MEM*
2 REM *                            *
3 REM *   RUN50000 TO CHECK DATA   *
4 REM ******************************
10 AD=49152
20 READA:IFA=-1THENEND
30 POKEAD,A:AD=AD+1:GOTO20
200 DATA72,169,0,133,251,169,160,133,252:REM 7663
201 DATA104,168,192,0,240,17,24,165,251:REM 6065
202 DATA105,128,133,251,165,252,105,0,133:REM 6033
203 DATA252,136,76,11,192,96,32,227,193:REM 6109
204 DATA32,0,192,160,0,32,207,255,201:REM 6738
205 DATA13,240,6,145,251,200,76,41,192:REM 6134
206 DATA169,0,145,251,169,13,32,210,255:REM 6730
207 DATA32,240,193,96,32,227,193,32,0:REM 4604
208 DATA192,169,54,133,1,160,0,177,251:REM 5864
209 DATA32,210,255,200,201,0,208,246,169:REM 7967
210 DATA55,133,1,32,240,193,96,32,227:REM 5781
211 DATA193,32,0,192,160,0,169,0,145:REM 4313
212 DATA251,200,192,127,208,249,32,240,193:REM 8150
213 DATA96,32,227,193,169,0,72,32,97:REM 4091
214 DATA192,104,168,200,152,201,64,208,244:REM 7978
215 DATA32,240,193,96,32,227,193,134,253:REM 7697
216 DATA132,254,32,0,192,160,0,177,253:REM 6349
217 DATA145,251,201,0,240,5,200,192,127:REM 6559
218 DATA208,243,32,240,193,96,32,227,193:REM 7068
219 DATA134,253,132,254,32,0,192,160,0:REM 4836
220 DATA169,54,133,1,177,251,145,253,201:REM 7919
221 DATA0,240,5,200,192,127,208,243,169:REM 7938
222 DATA55,133,1,32,240,193,96,32,227:REM 5781
223 DATA193,72,138,32,0,192,165,251,133:REM 6391
224 DATA253,165,252,133,254,104,32,0,192:REM 5717
225 DATA160,0,169,54,133,1,177,251,72:REM 5449
226 DATA177,253,145,251,104,145,253,200,192:REM 8611
227 DATA127,208,241,169,55,133,1,32,240:REM 5438
228 DATA193,96,32,227,193,72,138,32,0:REM 4008
229 DATA192,165,251,133,253,165,252,133,254:REM 9176
230 DATA104,32,0,192,169,54,133,1,160:REM 4484
```

CODE STRINGS

Graham Barbour helps you to write educational and quiz programs.

swaps two strings around. The first string is specified by the accumulator and the second by the register. For example,

```
LDA #$08
LDX #$05
JSR $C20C
```

String number 8 will now contain the information previous stored in string number 5 and vice versa.

COMPARE. Address $C20F: This sub-routine compares the string specified by the accumulator — we will call this A — with the string specified by the X register — we will call this B. The result of the comparison will be returned in the accumulator. The possible results are:

$FF this occurs if A is alphabetically less than B or if A and B are alphabetically the same but A is shorter than B.

$01 this occurs if A is alphabetically more than B or if A and B are alphabetically the same but A is longer than B.

$00 this occurs if the two strings are exactly the same. For example,

```
LDA # $01
LDX # $09
JSR $C20F
```

This compares strings 1 and 9. The result may now be used for a branch.

SORT. Address $C212: This sub-routine performs a bubble sort on all the strings from the string specified in the accumulator to the string specified by the X register. They are sorted into alphabetical order in a fraction of a second. For example,

```
LDA # $05
LDX # $3F
JSR $C212
```

This will sort strings 5 to 63 (Hex 3F) into alphabetical order.

SETNAM. Address $FFBD: This is a kernal sub-routine but is needed to define the file name for the next two routines which load and save strings. The accumulator must hold the length of the name. The X and Y registers must hold the address of where the name is stored in the usual way — the X register containing the least significant byte and the Y register the most significant byte. For example,

```
LDA # 05
LDX # 00
LDY # 80
JSR $FFBD
```

This will set a five character file name starting at address S8000.

SAVE. Address $C215: This routine saves strings to tape or disc, and must be used in conjunction with the Setnam routine. It saves from the string indicated in the accumulator up to and including the string in the X register. The Y register must contain the device number i.e. 8 for disc and 1 for tape. For example,

```
LDA # 10
LDX # 20
LDY # 08
JSR $C215
```

The above saves strings 16 to 32 — Hex 10 to 20 — onto disc.

LOAD. Address $C218: This routine loads strings and is used in conjunction with the Setnam routine. The Y register must contain the device number. For example,

```
LDY # 01
JSR $C218
```

This will load the previously saved strings from tape.

When these routines are called, the registers are not destroyed except where a value is returned e.g. Compare.

Program 1 is merely the loader program which transfers the sub-routines from Data lines to memory. If you have a machine-code monitor, you can save the actual sub-routine by saving from $C000 to $C250. The resulting program will be much shorter than program 1.

To enter program 1, type it leaving out the Rem statements and the numbers following them. Then, to test that all has been correctly entered, Run line 50000. Line 200 will appear followed by a number. Check that this number is the same as the number following the Rem statement for the corresponding line. If correct, press any key and the next line will appear. If incorrect, press Run Stop, list the suspect line and check it. Then Run 50000 again. ■

```
231 DATA0,177,251,209,253,240,22,144,10:REM 6044
232 DATA169,55,133,1,32,240,193,169,1:REM 4994
233 DATA96,169,55,133,1,32,240,193,169:REM 6073
234 DATA255,96,200,201,0,208,223,169,55:REM 6507
235 DATA133,1,32,240,193,169,0,96,0:REM 3938
236 DATA0,0,0,0,0,32,227,193,141:REM 4594
237 DATA67,193,142,68,193,169,0,141,72:REM 4906
238 DATA193,173,67,193,141,69,193,170,232:REM 7430
239 DATA32,254,192,201,1,240,13,174,69:REM 5469
240 DATA193,232,138,205,68,193,208,234,76:REM 7401
241 DATA131,193,173,69,193,170,232,32,205:REM 7022
242 DATA192,169,1,141,72,193,76,102,193:REM 5700
243 DATA173,72,193,201,1,240,200,32,240:REM 6961
244 DATA193,96,32,227,193,141,69,193,169:REM 6748
245 DATA54,133,1,232,142,71,193,152,170:REM 6484
246 DATA169,1,160,1,32,186,255,173,71:REM 5739
247 DATA193,32,0,192,165,251,141,67,193:REM 6616
248 DATA165,252,141,68,193,173,69,193,32:REM 5682
249 DATA0,192,169,251,174,67,193,172,68:REM 6506
250 DATA193,32,216,255,169,55,133,1,32:REM 4327
251 DATA240,193,96,32,227,193,152,170,169:REM 7280
252 DATA1,160,1,32,186,255,169,0,32:REM 4383
253 DATA213,255,32,240,193,96,141,237,193:REM 7940
254 DATA140,239,193,142,238,193,96,0,0:REM 4785
255 DATA0,173,237,193,172,239,193,174,238:REM 9008
256 DATA193,96,76,33,192,76,67,192,76:REM 4850
257 DATA97,192,76,118,192,76,139,192,76:REM 5790
258 DATA168,192,76,205,192,76,254,192,76:REM 7014
259 DATA73,193,76,142,193,76,206,193,0:REM 5662
260 DATA0,0,0,0,0,0,0,0,0:REM 0
270 DATA-1
50000 FL=200
50010 CO=1:AV=0:FORI=0TO8:READA:IFA=-1
      THENPRINT"OK":END
50015 AV=AV+(CO*A):CO=CO+1:NEXT
50020 PRINT"LINE";FL;"...";AV
50030 PRINT"PRESS"
50040 GETA$:IFA$=""THEN50040
50060 FL=FL+1:GOTO50010
```

IF YOU typed in last month's music editor, you will have produced data files of your favourite tunes, waiting to install them into the operating system of your BBC. Once installed two entry points are available from calling programs. An activation address will cause the tune to start playing, a call to the deactivation address will stop the tune after the sound buffer has processed at most two notes.

The most obvious application for this is to accompany games. The routine is very well behaved. As it is interrupt driven the tune will proceed without interference from the game program written in Basic or machine code.

Any memory locations used outside its own defined area are preserved across the period of time the tune system is active. This allows machine code programmers not to be concerned with page zero locations reserved for this routine.

As is usual with machine-code routines an area of memory will have to be declared for it and the machine code itself assembled for this area. The amount of memory needed for the routine will depend on the length of the tune. In general, the routine itself will need in the order of 300 bytes and each note will add two bytes to the length of the code.

Once the file produced by this system has been loaded into the machine it has to be protected. Any interference with the event vector in page two has to be legitimate. The int'tune system uses this vector correctly, finishing with a jump to the original destination after the routine has completed.

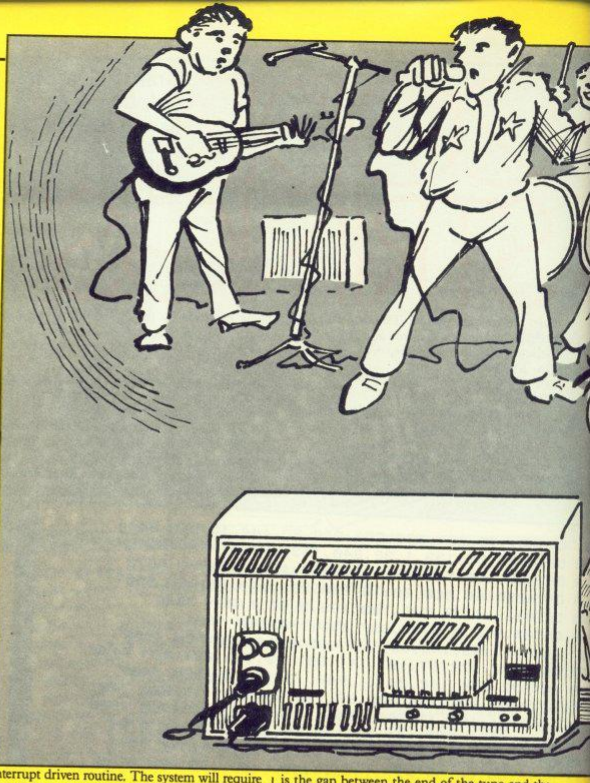
Any other routines chained onto the vectors should do the same else the int'tune system will be bypassed. Likewise, the contents of the registers should be preserved over any other use of the vector. In Basic and other systems the value of Page or other system variables should be moved to protect the code once it has been installed.

For example, with disc users where Page normally resides at address Hex 1900 and the tune system is two pages long, Page should be moved to Hex 1B00 before the tune is loaded and the code assembled from 1900 onwards.

Having decided on the address where the routine is to be installed and the data file is available, the program can be run to produce the interrupt driven routine. The system will require you to input the assembly address and the data file name. This is then followed by the sound and envelope number which the tune is to use.

The users' programs should avoid using the selected sound channel. The last input requested is the gap between the end of the tune and the restart of the tune. This is in intervals of 1/25th of a second, and should be in the range 1 to 255.

After these values have been confirmed the code will be assembled. This will require the data file to be read in, tape users should watch the



```
10 REM INT'TUNE2
20 REM FINTAN CULWIN
30 REM APRIL 1984
90 MODE 7
100 PROC_inputs
110 FOR opt = 0 TO 2 STEP 2
120 P% =location
130 PROC_interupt
140 PROC_checks
150 PROC_delay
160 PROC_main
170 NEXT opt
180 PROC_done
190 END
200 DEF PROC_inputs
210 REPEAT
220 OK = TRUE
230 CLS
240 FOR ytab=0 TO 1
250 PRINTTAB(12,ytab)CHR$(141)"INT'TUNE2"
260 PRINTTAB(12,ytab+2)CHR$(141)"ssssssssss"
270 NEXT ytab
280 PRINTTAB(2,6)"Assembly address"
290 PRINTTAB(2,8)"Input filename "
300 PRINTTAB(2,10)"Envelope number "
310 PRINTTAB(2,12)"Channel  number"
320 PRINTTAB(2,14)"Delay (4.04 s)"
330 INPUT TAB(21,6)location%
340 location = EVAL("&"+location%)
350 INPUT TAB(21,8) filename$
360 REPEAT
370 PRINTTAB(21,10)SPC(15);
380 INPUT TAB(21,10) envelope
390 IF envelope (0 OR envelope > 16 THEN PROC_wally
400 UNTIL envelope >-1 AND envelope < 17
410 REPEAT
420 PRINTTAB(21,12)SPC(15);
430 INPUT TAB(21,12) channel
440 IF channel (1 OR  channel >3 THEN PROC_wally
450 UNTIL channel >0 AND channel <4
460 INPUT TAB(21,14) delayget
470 PRINTTAB(8,23)"CONFIRM (Y/N)";
480 REPEAT
490 response = GET AND 223
500 UNTIL response = "Y" OR  response = "N"
510 IF response = "Y" THEN OK = FALSE
520 UNTIL OK
530 OSBYTE = &FFF4
540 DSWORD = &FFF1
550 DIM pitches(1),durations(7)
560 FOR pitch = 0 TO 1
570 READ pitches(pitch)
580 NEXT pitch
590 FOR duration = 0  TO 7
600 READ durations(duration)
610 NEXT duration
620 ENDPROC
700 DEF PROC_done
710 PRINTTAB(2,16)"Activation address"TAB(24,16)"A
ctivate
720 PRINTTAB(2,18)"Deactivation address"TAB(24,18)
"Deactivate
730 PRINTTAB(2,20)"Highest location "TAB(24,20)"%b
p
740 PRINTTAB(8,23)SPC(18)"TAB(10,22)
750 CALL activate
760 ENDPROC
900 DEF PROC_wally
910 VDU7
920 *FX 15,0
930 PRINTTAB(8,22)CHR$(134)"OUT OF RANGE !!"
940 PRINT TAB(9,23)"PRESS ANY KEY."
950 response=GET
960 PRINTTAB(2,22)  SPC(20)"SPC(22)
970 ENDPROC
1000 DEF PROC_interupt
1010 [ OPT opt
1020 .activate
1030LDA &220          \
1040STA revec         \
1050LDA &221          \
1060STA revec+1       \ preserve original vector
1070LDA #(main MOD 256)
1080STA &220          \
1090LDA #(main DIV 256)
1100STA &221          \ install new vector
1110JSR reset         \ set to start of tune
1120JSR envset        \ define envelope
1130LDA #&FF          \
1140STA flag          \ delay not active
1150LDA #&DE          \
1160LDX #4            \
1170JSR OSBYTE        \ &FX 14,4 enable interrupts
1180RTS               \ from activation routine
1190.deactivate
1200LDA revec
1210STA &220
1220LDA revec+1
1230STA &221          \ restore original vector
1240RTS               \ from deactivation routine
1250 ]
1260 ENDPROC
1500 DEF PROC_main
1510 [ OPT opt
1520 .main
1530 ]
1540 PROC_checks
1550 PROC_delay
1560 PROC_soundit
1570 PROC_utility
1580 PROC_data
1590 ENDPROC
2000 DEF PROC_checks
2010 [OPT opt
2020STA sbuf+4        \ preserve A register
2030PHA
2040TXA
2050PHA
2060TYA
2070PHA               \ stack registers
2080LDA &70
2090PHA
2100LDA &71
2110PHA               \ stack page zero locations
2120LDA sbuf+4
2130CMP #4            \
2140BNE exit          \ test A register for interr
upt #4
2150LDA flag
2160BNE no_delay      \ branch if delay not active
2170JMP delay         \ service delay
2180.no_delay
2190LDA #&80
2200LDX #(25) - channel)
2210JSR OSBYTE        \ examine chosen sound buffe
r
2220CPY #14
2230BCC exit          \ branch if sounds being pro
```

BEEBSKI BEAT

Fintan Culwin with the second part of his music program for the Beeb.

"cassette motor" led on the keyboard and start the tape with the data file when it lights up. When the code has been assembled it will demonstrate itself, and provide its activation, deactivation and high water addresses. A copy of the file can be saved with the command:

*SAVE filename assembly address highest point (activation address) <RETURN>

If the activation address is included in the command then the routine will self activate when it is loaded.

The routine uses the screen refresh event to time the system. When screen interrupts have been enabled, every 1/25th of a second the operating system jumps to the address contained in &220/1 with the accumulator containing the event code 4.

In order to install this system the contents of the vector have to be preserved and the address of the main part of the routine installed into the vector and screen refresh interrupts enabled. This is accomplished within the listing within PROC_install labelled activate.

In addition the envelope is defined with a call to a routine labelled envdef and the pointers set to the start of the tune with reset. The deactivation routine within the same procedure removes the sound driver by restoring the original vector. A tidier deactivation can be accomplished by disabling the interrupts with a

*FX 13,4

This may be a bad idea as other routines could be using these interrupts. Additionally the sound channel buffer could be cleared by using a

*FX 21

command.

The routine labelled main is pointed to by the new vector. It consists of three major parts. Setting up for interrupt, testing certain conditions and leaving the interrupt in an orderly manner. To set up for interrupt the A register is first preserved in Ram, then it, all other registers and two page zero locations are stacked.

The exit routine has to tidy the stack, restoring all values to the correct locations, and passing control to the address of the original vector. This is the only exit point from the routine.

The middle part first tests the Ram copy of the A register to determine if the interrupt was a screen refresh; with a fast exit if it isn't. A branch to the delay routine takes place if the delay is currently active, this is signalled by a flag. The state of the sound channel is then sampled.

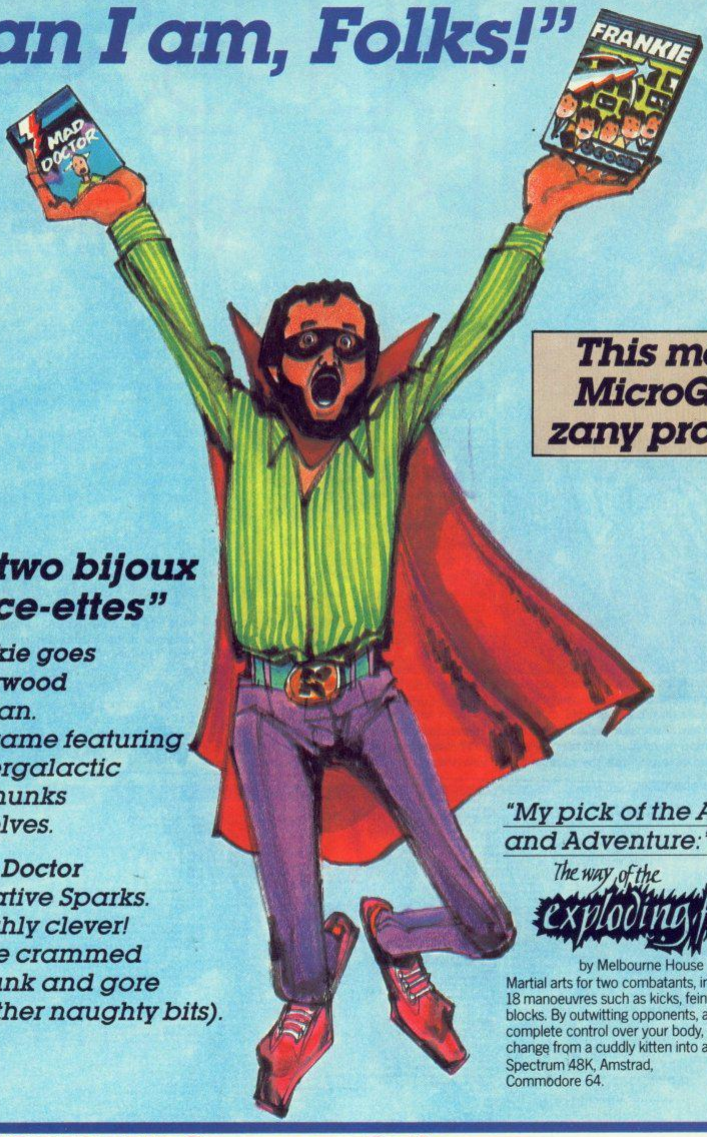
If there are less than two notes waiting to be processed the program jumps to the soundit routine to place another note in the buffer else the program exits.

In order to enter a note into the sound buffer the routine has to have some way of knowing which is the next note to be played. This is provided by a 16 bit location called counter. The contents of this location are transferred to page zero. The two values pointed to by this are then put into the sound buffer definition area, and a sound osword command executed.

The counter is then incremented by two and a check made to see if the end of tune has been reached. When the end of tune is met the counter is reset and the delay flag enabled. ■

```
essed
2240JMP soundit          \ put one note in buffer
2250.exit
2260PLA
2270STA &71
2280PLA                  \ restore page zero locatio
2290STA &70
ns
2300PLA
2310TAY
2320PLA
2330TAX                  \ restore registers
2340PLA                  \ jump to original vector
2350JMP (ravec)
2360 ]
2370 ENDPROC
2380 DEF PROC_delay
2390 [ OPT opt
2400 .delay
2410 INC delcount
2420 LDA delcount
2430 CMP delaytarget     \ branch if delay NOT expir
2440 BNE .dundel         \ ed
2450 LDA #&FF
2460 STA flag            \ change flag
2470JSR .reset           \ point to start of tune
2480 .dundel
2490 JMP exit
2500 ]
2510 ENDPROC
2520 DEF PROC_soundit
2530 [ OPT opt
2540 .soundit
2550 LDA counter
2560 STA &70
2570 LDA counter+1
2580 STA &71             \ pointer to next note
2590 LDY #0
2600 LDA (&70),Y         \ move pitch to note buffe
2610 STA sbuff+4
r
2620 INY
2630 LDA (&70),Y         \ move duration to sound b
2640 STA sbuff+6
uffer
2650 LDA #7
2660 LDX #sbuf MOD 256
2670 LDY #sbuf DIV 256
2680 JSR OSWORD          \ sound command
2690 CLC
2700 LDA &70
2710 ADC #2
2720 STA counter
2730 LDA &71
2740 ADC #0
2750 STA counter+1       \ point to next note
2760 CMP #ltop DIV 256
2770 BNE notdun          \ test hi byte for end o
f tune
2780 LDA counter
2790 CMP #ltop MOD 256
2800 BNE notdun          \ test lo byte for end o
f tune
2810 JSR reset           \ point to start of tune
2820 LDA #0
2830 STA flag            \ enable delay routine
2840 STA delcount        \ zero delay counter
2850 .notdun
2860 JMP exit
2870 ]
2880 ENDPROC
2890 DEF PROC_utility
2900 [ OPT opt
2910 .reset
2920 LDA #lbottom MOD 256
2930 STA counter
2940 LDA #lbottom DIV 256
2950 STA counter+1       \ counter points to star
t of tune
2960 .envdef
2970 LDA #8
2980 LDX #lenvbuf MOD 256
2990 LDY #lenvbuf DIV 256
3000 JSR OSWORD          \ perform envelope comm
and
3010 ]
3020 ENDPROC
3030 DEF PROC_data
3040 IF opt > 2 THEN ENDPROC
3050 [ OPT opt
3060 .revec NOP : NOP
3070 .counter NOP : NOP
3080 .delcount NOP
3090 .flag NOP
3100 .envbuf
3110 ]
3120 PS = PS+14
3130 [ OPT opt
3140 .sbuf
3150 ]
3160 !sbuf+1 = 0
3170 !sbuf+5 = 0
3180 .sbuf = 0
3190 ?sbuf = channel
3200 sbuf?2 = envelope
3210 REM invariant
3220 PS=PS+8 : bottom = PS
3230 REM bottom points to start of tune
3240 chan = OPENIN(filename$)
3250 ?envbuf = envelope
3260 FOR parameter = 1 TO 13
3270 value = BGET #chan
3280 envbuf?parameter = value
3290 NEXT parameter
3300 REM first thirteen bytes define envelope
3310 REPEAT
3320 pitch = BGET #chan
3330 duration = BGET #chan
3340 PS?0 = pitch:PS?1 = duration:
3350 PS?2 = duration:PS = PS+3
3360 REM translate from codes to values
3370 REPEAT UNTIL EOF #chan
3380 top = PS
3390 REM top shows end of tune
3400 ENDPROC
3410 DATA 101,109,117,121,129,137,145,149,157,165,169
,177
3420 REM pitch values
3430 DATA 5,7,10,15,20,30,40,60
3440 REM duration values
```

"These are even crazier than I am, Folks!"



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1. Frankie goes to Hollywood by Ocean.
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International Micro Software Division

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mystery makes his own review...

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Commodore 64

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Commodore 64 Commodore 16

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All games featured above are available from Laskys, WH Smith and other good software stores.

COMMODORE 64, BBC AND SPECTRUM

Figure 1. CBM-64.

```
5 REM   HEX LOADER FOR CBM 64   FIG.1
6 REM
10 FOR I=800 TO 727:READR:POKEI,A:T=T+A
20 NEXT:IF T=6716 THEN GOTO 100
30 PRINT"ERROR IN DATA ";T-6716:END
40 DATA 169,1,133,186,169,1,133,184
50 DATA 133,185,169,8,133,183,169,208
60 DATA 133,187,169,2,133,188,169,56
70 DATA 133,251,169,199,133,252,169,251
80 DATA 162,231,160,206,32,216,255,96
90 DATA 65,79,87,76,76,79,65,68
100 SA=51000:LA=52855
110 INPUT"START ADDRESS";A
120 IF (A<SA) OR (A>LA) THEN GOTO 140
130 IF A/8=INT(A/8) THEN GOTO 150
140 PRINT:PRINT"ADDRESS ERROR":GOTO 110
150 T=(A-32768)AND255:PRINTA;:INPUTD$
160 IF D$="END" THEN GOTO 900
170 IF LEN(D$)=20 THEN GOTO 190
180 PRINT"WRONG LENGTH":GOTO 150
190 FOR B=0 TO 7:B$=MID$(D$,2*B+1,2)
200 GOSUB 300:IF E=1 THEN GOTO 280
210 POKE A+B,D:T=T+D:NEXT
220 B$=MID$(D$,18,3):GOSUB 300
230 IF E=1 THEN GOTO 280
240 IF T=D THEN GOTO 260
250 PRINT"CHECKSUM ERROR":GOTO 150
260 A = A+8:IF A<LA THEN GOTO 150
270 GOTO 800
280 PRINT TAB(9+2*B+D)C#"??"
290 FOR N=1 TO 3:NEXT:GOTO 150
300 E=0:D=0:FOR N=1 TO LEN(B$)
310 C#=MID$(B$,N,1):GOSUB 400
320 IF E=1 THEN D=N:N=4:NEXT:RETURN
330 D=D*16+X:NEXT:RETURN
400 X=ASC(C$)-48:IF X<9 THEN E=1:RETURN
410 IF X<10 THEN RETURN
420 X=X-7:IF X<10 THEN E=1:RETURN
430 IF X>15 THEN E=1
440 RETURN
500 H#="0123456789ABCDEF"
510 FOR A=SA TO LA STEP 8
520 PRINT A;":";T=(A-32768)AND255
530 FOR B=0 TO 7:X=PEEK(A+B):GOSUB 600
540 T=T+X:NEXT:PRINT"=";
560 V=INT(T/256):PRINT MID$(H#,V+1,1);
570 X=255 AND T:GOSUB 600:PRINT
580 NEXT:GOTO 900
600 PRINT MID$(H#,INT(X/16)+1,1);
610 PRINT MID$(H#,1+(XANDI15),1):RETURN
800 SYS 680:C#=CHR#(34)
810 PRINT"PRINT" TO RELOAD CODE :"
815 PRINT:PRINT"  LOAD"C#"DOWNLOAD";
820 PRINTC#",1,1  (RETURN)"
825 PRINT:PRINT"  THEN TYPE   NEW";
830 PRINT"  (RETURN)"
835 PRINT"TO RUN THE PROGRAM";
840 PRINT"  SYS 51000  (RETURN)"
900 PRINT:PRINT"ENTER DATA"
910 PRINT"2  PRINT DATA"
920 PRINT:PRINT"3  SAVE DATA"
930 INPUT Z:ON Z GOTO 100,500,800
```

Figure 2. CBM-64.

```
51000 > A9068D21D08D20D0=3E2
51006 > A90F8D802A90E20=2E4
51012 > D2FFA9008D15D0A9=4D0
51018 > 20CAC9002C10F0F8=4D5
51024 > CAAD00CE931F023=532
51030 > C935F014C936D006=43F
51036 > 20D2FF202FC8C7A914=410
51042 > 203FC8A9202DD2FF=461
51048 > CC202C20A9A8C8206=411
51054 > A9CE85FC8A9B5BF1=4F1
51060 > 00209CC202FCD80=547
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51480 > 4C57C20D2CB0CE=4CE
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51852 > C8A0000C7CCE8C7D=447
51858 > CE20D2CBB0F091FB=5BF
51864 > F020D2CE8D0C7CED0=4D3
51870 > 00A9FF8D00A9D2DF=4D8
51876 > 4C57C20D2CB0CE=4CE
51882 > CD7DCEF00A2C9=473
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53610 > 4E544552202145=28C
53616 > 4E544552202145=28C
53622 > 4E544552202145=28C
53628 > 4E544552202145=28C
```

TELSOFT

A reminder of how to use the Telsoft service.

a number of other makes. For the CBM-64 it will initially only be available with the OEL Comms pack together with the Telemond 2 or similar modem; later we hope to adapt the service to work with Commodore's modem.

To enter the download program first type in the hexloader for your machine — figure 1 — and then enter the machine code — figure 2. Once the program has been saved you can run it by entering CALL &6000 on the BBC, SYS 51000 on the CBM 64, RANDOMIZE USR 60000 on the Spectrum.

To find out what is available and how to receive software dial up Colchester (0206) 8068. This audio recorded information line will also advise you which telephone numbers to ring for the 300 and 1200 bit/s services.

When a program you want to download is on line, make sure your modem is set up and dial the number appropriate to its speed. As soon as you hear the modem tones switch the modem to line and replace the receiver. Select Option 1 from the menu — Receive. After a block of data is received you will see "OK" printed if there are no errors, otherwise the program will wait for the blocks to come round again. When the "Program loaded OK" message appears return to the Telsoft menu and select Option 5. You can now save and run the program.

Note that CBM-64 owners will need to use Option 6 if machine code is to be saved.

Figure 1. BBC.

```
10 REM BBC HEX CODE LOADER
15 HIMEM=&6FFF
20 CLS:PRINT
30 INPUT " START ADDRESS (Hex)";A$
40 A=EVAL("&"+A$)
50 IF A>&6FF7 THEN 200
60 IF A<&2A00 OR A>&6FE7 THEN 20
70 PRINT "A= ";
80 INPUT ";a:
90 IF LEN(a$)<>16 THEN 50
100 T=0
110 FOR N=0 TO 7
120 X$= MID$(a$,2*N+1,1): GOSUB 300
130 IF E=1 THEN 260
140 X$= MID$(a$,2*N+2,1): GOSUB 300
150 IF E=1 THEN 260
160 B= EVAL("&"+MID$(a$,2*N+1,2))
170 ?A=B:A=A+1:T=T+B
180 NEXT
190 FOR N = 1 TO LEN(c$)
200 X$=MID$(c$,N,1):GOSUB 300
210 IF E =1 THEN A=A-1: GOTO 260
220 NEXT
230 IF T= EVAL("&"+c$) THEN 50
240 PRINT "CHECKSUM ERROR !"
250 A=A-8:GOTO 50
260 PRINT "TYPING ERROR !"
270 A=B:A DIV 8:GOTO 50
280 +SAVE "DOWNLOAD" 6A00 6FB7
290 END
300 E=0:IF ASC(X$)<48 THEN E=1:RETURN
310 IF ASC(X$)<65 THEN E=1:RETURN
320 IF ASC(X$)>71 THEN E=1
330 IF ASC(X$)>57 THEN E=1
340 RETURN
```

Figure 2. BBC.

```
6A00 :A9C0A0FEA2020F4,4C6
6A08 :F2B616C2048ADC9,38A
6A10 :31F8D0C954F8C9C9,4F0
6A18 :39F8A4C8C6A4C47,20D
6A20 :16A9C020E3FFA9B,4F0
6A28 :0A00A2FF20FFA9F,363
6A30 :A0C020F4FFA902,363
6A38 :A0202BF4FA9C0A,4D8
6A40 :FEA200202BF4FA8A,4BC
6A48 :8C20E3FF20F76BA9,429
6A50 :15A0120F4FFA000,38D
6A58 :A9FF0B99050F0FA,507
6A60 :A9150A2120F4FF20,394
6A68 :8CAC99F0200C6C08,348
6A70 :FF0A0004773A70B4,416
6A78 :179A7A0479B57020,38D
6A80 :D5AD5B297F8C900,489
6A88 :D8E2200C6C8D0D99,4E8
6A90 :7100C020D55DC009,364
6A98 :D0F8A000B57A29D8,422
6AA0 :D0D8A0D51C57A0A,354
6AA8 :1D5730B572D00C6C,289
6AB0 :D0D5D8C5FFC020D5,524
6AB8 :A6C0100DF0A57320,435
6AC0 :B26D200C6C8D0C5,3CC
6AC8 :17F0D0A9502D8C5FF,478
6AD0 :20E7FF4C6A200C,34F
6AD8 :C8D00C557F0D00A9,4BC
6AE0 :15D28C5FF20E7FF4C,4AC
6AE8 :A6A57A0D0F856F,43E
6AF0 :D0D28C5FF20A0D,380
6AF8 :D0D28C7FF4F9D20,380
6B00 :E5FF4C3A6B4C76A,469
6B08 :A000B47A0472D00C,2C9
6B10 :C0DF2917B2D50A7,477
6B18 :C0C4F2D2D200C6C,45A
6B20 :D0C3C57AF000A950,4CE
6B28 :20E3FF20E7FF4C7,498
6B30 :A0A20C6C8D0CFC57B,3C1
6B38 :F000A95020E3FF4C,444
6B40 :A76A02B7C0079F5F,3F6
6B48 :A50AC9020502B07,419
6B50 :A0A9C8D0D5A5CA995,38D
6B58 :20D6EA9502056C,298
6B60 :A91A5D120F4FF20,394
6B68 :FF4C6A20E3FF20,4D8
6B70 :6FD0519D0F7A9C,444
6B78 :20E3FF20A50A99A,437
6B80 :05D20A9AF9503A997,3D7
6B88 :200B4E28F06D200B,2D0
6B90 :D4A9B5200B4E9B0,2DA
6B98 :20E3FF20F0D6A9D2,502
6BA0 :20E0FF4C0C6A9955,38F
6BA8 :20386EA99F2055C,20E
6BB0 :4CA6A0A75200C6C,202
6BB8 :0B0F4200C6C200C,316
6BC0 :4C4C4B4B4C6CA49,33A
6BC8 :20A2FF4F4F2C8E3,43D
6BD0 :FFA9B20E3FF6BA9,51E
6BD8 :9CA000A6A9E0D20,41E
6BE0 :4B0D13C9F4FFA212,387
6BE8 :20FAFF6B029120F4,4C0
6BF0 :FFA29A20F4FA9A9,553
6BF8 :9CA000A6A8AE0D20,41E
6C00 :EBA25320F4FFA252,4E7
6C08 :20FAFF6B10A99A85,46F
6C10 :0FB47EA919A20B20,38D
6C18 :F4FF8D09C0B70D00,44D
6C20 :6B68A9CBAAA7E20,204
6C28 :49A6CA0F0D2B8D,374
6C30 :A5A0A9F0D2B8D,369
6C38 :6E8BEC6A99!A201,447
6C40 :20F4FF90A47E0D9,25C
6C48 :A00A9D0D0A2FF0,452
6C50 :2B49C0B00FAA7E,449
6C58 :A0A9E0A00A2FF0,452
6C60 :F4FFA900500AA9C,460
6C68 :20E3FF20A0A0A9F4,3E4
6C70 :A0A9E0A00A2FF0,252
6C78 :20B6D0A0A2FF0,8D
6C80 :F0B5D3A0020F8D,39C
6C88 :20156DC9A1FF0A,3C4
6C90 :4CF81C7143F8174C,3A2
6C98 :616CA90A0120F4,335
6CA0 :FF4C87C6A99A203,3C4
6CA8 :20F4FF4CB76A9F8,433
6CB0 :D2A28F4FFE6A0A5,4CE
6CB8 :C0A9B20A0A20120F4,4
6CC0 :E6A9B20A0A6E20F8,2C4
6CC8 :D0A8172015D6C9,2D0
6CD0 :F0B0C942F8110943,413
6CD8 :FB174C616CA9B7A2,372
6CE0 :0120F4FF4C09D4A9,37F
6CE8 :07A2B20F4FF4C8F,314
6CF0 :A6A9B7A2A20F4FF,3D6
6CF8 :E6A0A5C9B0D0A9,4A7
6D00 :A9E0A0A20120F4,3E0
6D08 :C9F2C3FFA7E20A0,46
6D10 :A0A9B20A0A20120F4,3E0
6D18 :A9E0A0A20120F4,3E0
6D20 :C2855A6C8D0A0A0,2E3
6D28 :20A0A9B20A0A20F8D,2C1
6D30 :C8D0A0A20F8D,2C1
6D38 :20A0A9B20A0A20F8D,2C1
6D40 :A9B0C3FF20BA6D,3EF
6D48 :A9B0C3FF20A9A0,38A
6D50 :A9B20A0A6E0D50A0020,361
6D58 :F8A0D20A0A6D20999D,3C0
6D60 :20999D20999D20A0A,317
6D68 :A9B0C3FF20A0A20F8,2C6
6D70 :A9B0C3FF20A0A20F8,2C6
6D78 :6D20A0A0A9B22D00,270
6D80 :6E20F8A0D20A0A20,348
6D88 :E7FFA9D220E0FF4C,5D0
6D90 :A9BFA20D20FF4F68,3D5
6D98 :A9B0C3FF20A0A20F8,2C6
6DA0 :6D20A0A0A6D20A0A,33A
6DA8 :20A0A20E7FF20E7,445
6DB0 :FF6A82FF8A6A9A,3FE
6DB8 :A9B3BC93A3B0B31,1F1
6DC0 :69B72BC3FF6B29F,312
6DC8 :69B72BC3FF6B29F,312
6DD0 :B93BC93A3B0B31A9,1F8
6DD8 :B720E3FF6B457B85,3AE
6DE0 :7B20B0A57B20A9B0F,3A1
6DE8 :A57B9B0D57B0A57A,39B
6DF0 :A9100A7A267A27B,299
6DF8 :C1DAE86A020E3FF20,5AC
6E00 :B1B2C9B0D0FAC860,4F7
6E08 :B67DAA9B2020E3FF,470
6E10 :CA0BFA6A7D6AC7FF,55F
6E18 :D0B9A9A6A20E3FFE0,4FD
6E20 :0EC9B0FA0AC9B0FF8,3A1
6E28 :0AC9B0FA0AC9B0FF8,3A1
6E30 :B57C867D847EA991,440
6E38 :A20120FF4FA9A2A2,484
6E40 :B72BF4FF9292B2FF4,4B4
6E48 :20FAFF9292B2FF4,41F
6E50 :A7CA997D2B2BF4FF,464
6E58 :FF9B3A2B42BF4FF,464
6E60 :A991A2B20FF4FF8,49F
6E68 :A9B0C3FF20A0A20F8,2C6
6E70 :A9B0C3FF20A0A20F8,2C6
6E78 :6D20A0A0A6D20A0A,33A
6E80 :A9B0C3FF20A0A20F8,2C6
6E88 :A9B0C3FF20A0A20F8,2C6
6E90 :A9B0C3FF20A0A20F8,2C6
6E98 :A9B0C3FF20A0A20F8,2C6
6EA0 :A9B0C3FF20A0A20F8,2C6
6EA8 :A9B0C3FF20A0A20F8,2C6
6EB0 :A9B0C3FF20A0A20F8,2C6
6EB8 :A9B0C3FF20A0A20F8,2C6
6EC0 :A9B0C3FF20A0A20F8,2C6
6EC8 :A9B0C3FF20A0A20F8,2C6
6ED0 :A9B0C3FF20A0A20F8,2C6
6ED8 :A9B0C3FF20A0A20F8,2C6
6EE0 :A9B0C3FF20A0A20F8,2C6
6EE8 :A9B0C3FF20A0A20F8,2C6
6EF0 :A9B0C3FF20A0A20F8,2C6
6EF8 :A9B0C3FF20A0A20F8,2C6
6F00 :A9B0C3FF20A0A20F8,2C6
6F08 :A9B0C3FF20A0A20F8,2C6
6F10 :A9B0C3FF20A0A20F8,2C6
6F18 :A9B0C3FF20A0A20F8,2C6
6F20 :A9B0C3FF20A0A20F8,2C6
6F28 :A9B0C3FF20A0A20F8,2C6
6F30 :A9B0C3FF20A0A20F8,2C6
6F38 :A9B0C3FF20A0A20F8,2C6
6F40 :A9B0C3FF20A0A20F8,2C6
6F48 :A9B0C3FF20A0A20F8,2C6
6F50 :A9B0C3FF20A0A20F8,2C6
6F58 :A9B0C3FF20A0A20F8,2C6
6F60 :A9B0C3FF20A0A20F8,2C6
6F68 :A9B0C3FF20A0A20F8,2C6
6F70 :A9B0C3FF20A0A20F8,2C6
6F78 :A9B0C3FF20A0A20F8,2C6
6F80 :A9B0C3FF20A0A20F8,2C6
6F88 :A9B0C3FF20A0A20F8,2C6
6F90 :A9B0C3FF20A0A20F8,2C6
6F98 :A9B0C3FF20A0A20F8,2C6
6FA0 :A9B0C3FF20A0A20F8,2C6
6FA8 :A9B0C3FF20A0A20F8,2C6
6FB0 :A9B0C3FF20A0A20F8,2C6
6FB8 :A9B0C3FF20A0A20F8,2C6
6FC0 :A9B0C3FF20A0A20F8,2C6
6FC8 :A9B0C3FF20A0A20F8,2C6
6FD0 :A9B0C3FF20A0A20F8,2C6
6FD8 :A9B0C3FF20A0A20F8,2C6
6FE0 :A9B0C3FF20A0A20F8,2C6
6FE8 :A9B0C3FF20A0A20F8,2C6
6FF0 :A9B0C3FF20A0A20F8,2C6
6FF8 :A9B0C3FF20A0A20F8,2C6
```

Figure 1. Spectrum.

```
5 REM SPECTRUM 48k
10 REM Hex Code Loader
15 CLEAR 59000
20 POKE 23658,8: CLS : PRINT
30 INPUT " Start Address "is
50 IF a>61135 THEN GO TO 20
60 IF a<60000 THEN GO TO 20
70 PRINT a;
80 INPUT " ";b$
85 IF b$="END" THEN GO TO 260
90 IF LEN b$<>2*32 THEN GO TO 260
100 LET t=a-25600 INT (a/256)
110 FOR n=0 TO 7
120 LET x$=b$(2*n+1 TO 2*n+2)
125 GOSUB 300: LET y=x
130 IF e=1 THEN GO TO 260
140 LET x$=b$(2*n+3 TO 2*n+4)
145 GOSUB 300: LET y=y*16+x
150 IF e=1 THEN GO TO 260
160 POKE a,y: LET a=a+1
170 LET t=t+y: NEXT n: LET y=0
180 NEXT
190 FOR n = 1 TO LEN c$
200 LET x$=c$(n): GOSUB 300
210 IF e=1 THEN GO TO 260
220 LET y=y*16+x
230 NEXT n
240 IF t<> VAL c$ THEN GO TO 280
245 GOSUB 300: LET a=a-1: GO TO 260
250 PRINT "Checksum Error"
258 LET a=a-8: GO TO 50
260 PRINT "Typing Error"
270 LET a=a-8: GO TO 50
280 SAVE "Download"CODE 60000,1136
290 POKE 23658,0: STOP
300 LET e=0: LET y=CODE x$-48-7*(x$>"9")
310 IF x<0 OR x>15 THEN LET e=1
320 RETURN
```

Figure 2. Spectrum.

```
60000 :CD15EDC307ECCD15,4C7
60008 :EDCD36ECCD6AEDCD,63
60016 :58ED2A7E3E3BCD,9AF
60024 :BBFFE31CA99EAFE,69
60032 :35CA07EAC36AEACD,508
60040 :15ED2AFACD8AEACD,5A8
60048 :CD9CCD15EDC36,553
60056 :EACD66ED11E5EE06,58C
60064 :003EFF11311B0E06,4D0
60072 :15EE1CDEE8617E,3D2
60080 :2D12310FCCD1FED,5D0
60088 :3DFCD50ECDD1FED,5B0
60096 :3E3F3E26EF3E0032,369
60104 :6CEF326EF3270EF,544
60112 :3A65FCDE6FCD6FE,5C2
60120 :8916E5EFCD1FEDDA,5D1
60136 :AAEA131CDDE6CDD,552
60144 :20F23A06?FE6A020,51A
60152 :8D214B5C3A6BEFBC,3DC
60160 :D0A47B9226BEFBE00,1DA
60168 :11CDEECD1FED38?A,4F7
60176 :1213BCCDEBEC79FE,45C
60184 :1B20F83A6BEFBCD,1A7
60192 :FEF6BF01FEDDAAAEA21,574
60200 :6FEFBE2B133E5011,326
60208 :E0EE12133E0012CD,348
60216 :D7CDDA6ECC3AAEA,681
60224 :CD1FEDDAAAEA217B,518
60232 :EFBE2B1E5EDD21,4A4
60240 :3E000E6C3E000C6C,3C7
60248 :3E000E2BCD0D7EC,4A7
60256 :3E21CD0D7EC3E0,4A7
60264 :3E3E32AFEF3270EF,3C7
60272 :ED5BAEBF8C00CD1F,480
60280 :EDDA6AEA3273EF3A,4A7
60288 :CD1C3A6BEFFE0020,586
60296 :1853A9FE6A003A73,432
60304 :EF1213A3A6BEFBF,3DC
60312 :2D2D2CCD1FEDDAAAEA,5D8
60320 :216FEFBE2CDD6D0,504
60328 :1FEDDAAAEA2178EF,5A2
60336 :BE22CDE3E4F32E2,5D0
60344 :EE36B32E3EE3E000,498
60352 :32E4E3A6BEFBCD,4A7
60360 :CDDEEDDTEEC0D7EC,553
60368 :CDA6EC21E5EE3A60,5C5
60376 :EFB5EF000E736,422
60384 :0021E5EEED4B66EF,561
60392 :0C7EEF000C2DDEA23,4FC
60400 :0020F63EFACD8AED,589
60408 :3E1D3FEC3A6EACD,5E8
60416 :1FED38FBC3BDEAF3,594
60424 :B683AFD3F3FB23E,338
60432 :4B03FF3EFFD3FF3E,5AF
60440 :33D3FF3E8F320F5C,305
60448 :32F4B5C3E3E81,250
60456 :D3FE21915CB9EFB,5A0
60464 :CD5BED3A6EACD15,52F
60472 :EECDDA6EEC3A6EAC,5A0
60480 :CD4ECCDA3ECCDAA,454
60488 :CD4ECCDA3ECCDAA,454
60496 :CD4ECCDA4ECCDAA,661
60504 :EC233E00CD6FCD,483
60512 :B4EC3C9CD3A3E83,498
60520 :CDBFECCD4ECC9CD,688
60528 :3AEC3E07CDBFECCD,5D8
60536 :B4EC3C9CD3A3E83,498
60544 :CDBBED23C384ECFE,651
60552 :CDBBED3EF328C5C,574
60560 :CDBBED3EF328C5C,574
60568 :3DC3DFEECDA6EC,B50
60576 :CDA3ECCDA6EC3E80,5A6
60584 :CDBBED3EF328C5C,574
60592 :C9F513EF4C21FC9,6DC
60600 :FCB1FCB1FF63BFE,4C7
60608 :3AFAC4ECC6071213,498
60616 :FIE6BFE63BF5AFA,686
60624 :D4ECCA671213C921,46C
60632 :CDEEEC3DD6EEC1B6,49C
60640 :13E2077231BFC3E,339
60648 :0877C9E5217BFFAE,53B
60656 :77C50E0077EA7D3F,44F
60664 :30007EEEB6773A6F,3C9
60672 :EFEE1832AFEF3721,3D5
60680 :6FEFCB162C3D1680,350
60688 :6FEFCB1E1C9110581,394
60696 :216A00CDB583C93E,391
60704 :9B327EFCDB7EFDDA,529
60712 :CDEDF1C366EACDAC,5C8
60720 :ED7B6E01F6D23F,548
60728 :AF2177EF3520237,2FC
60736 :CD7B6D3EBC9CD,DF8
60744 :47EDDBFECB37C9,5E6
60752 :F5DB7F3A01EFEFB,3B7
60760 :2B84E3E31B023E37,187
60768 :D3FFDB7F1C9F53A,673
60776 :B1EFEFB0D2B84E3E,376
60784 :D3FFDBEDF1C93E,644
60792 :00DBFFE6037CDB3F,59C
60800 :FFE6B237CDBFFFC9,6A8
60808 :CDD47ED3E73EFD9,50E
60816 :1F1C366EAF53ED23,5E6
60824 :20BF1C9CDAED3D,52A
60832 :CDD47ED3E73EFD9,50E
60840 :1F2B13CDF9EDFEC,537
60848 :20B72CDB7FDB3E28,5A7
60856 :CDB7FDB3E28,5A7
60864 :3F7BD07B10B3E28,34F
60872 :D7BD07B10B3E28,34F
60880 :D7BD07B3AB05CE,4B8
60888 :D7BD07E3D3E,2E6
60896 :1210833E0BD73E3F,2E6
60904 :D7BD07DF1E1D1C1,640
60912 :C9FE0728C1FECEB28,4F3
60920 :11FE0C2B14FE0B28,3D8
60928 :1FE0C2B14FCDFE20A,367
60936 :BFEEFE00FA11EE3E,4BA
60944 :00C93E8F7D7D7D7D,4D7
60952 :1D7D7D7D7D7D7D7D,13E1032,1C4
60960 :B95CC93E12168D1,3D2
60968 :1122C9E5D5C5E5ED2,3E8
60976 :D5C2D4C5E5E38F9,451
60984 :CD01E6CD4?EE38F9,451
60992 :CD5CDE6CD4?EE38F,3D8
61000 :5CF5213B5CDBAEF1,433
61008 :1A7C93?CDBAEF1,11000,3DE
61016 :1A7C93?CDBAEF1C9444F57,406
61024 :4E4CF4144494E47,284
61032 :2B4D54455D5D5D5D,216
61040 :4D5D5D5D5D4345495?6,276
61048 :4D5D5D5D5D4345495?6,276
61056 :45005D2D2D2D4578,217
61064 :6974207D4F284261,328
61072 :73?6?5D2D2D5573,2DF
61080 :65205379?6D62F6C,393
61088 :2D5365?6?6?4?2D,308
61096 :2D5365?6?6?4?2D525,2C9
61104 :7475726E20746F28,39C
61112 :4D454E5D2D2D4E55?D,308
61120 :4E544E5?2D4E55?D,308
61128 :424552?D0D0D0D0D,1A2
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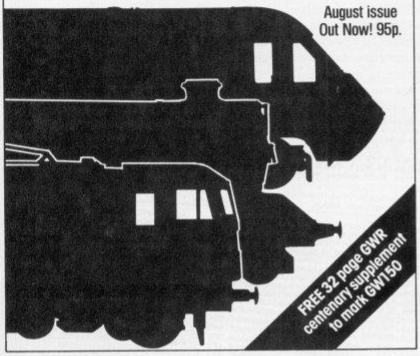

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"Poor is the pupil who does not surpass his master" Leonardo da Vinci is supposed to have said. Taking this principle to heart, for this month's £15 competition we would like you to outdo John Ransley by improving on the demonstration program he gives elsewhere in First Bytes.

In other words we want you to write your own Snake program making it — if possible — faster and more elaborate than John Ransley's, but not longer. It can be for any machine and can contain Peeks, Pokes, user defined graphics, print statements or whatever takes your fancy.

Despite the simplicity of the task we set for June's competition the response was disappointing. We were looking for an animation program based only on print statements and without any user-defined graphics.

From the few entries received we awarded the prize to Giorgio Berardi, Via Buonarroti 60, 47100 Forli, Italy. His program runs on the Spectrum but could easily be converted for other machines.

```
  5 LET a$="I COULD DO THAT"
 10 LET x=10: LET y=(32-LEN a$)
/2: LET g=3
 20 FOR n=30 TO y STEP -1
 30 PRINT AT x,n;a$(p)+" "
 40 NEXT n
 50 LET y=y+1: LET p=p+1
 60 IF p<(LEN a$+1) THEN GO TO
20
 70 PAUSE 50: LET y=(32-LEN a$)
/2
 80 FOR x=11 TO 20
 90 PRINT AT x,y;a$;AT x-1,y"
                  "; REM Number of
spaces=LEN a$
 100 NEXT x
 110 PAUSE 50: LET p=1
 120 FOR n=19 TO 1 STEP -1
 130 PRINT AT n,y;a$(p);AT n+1,y
;" "
 140 NEXT n
 150 PRINT AT n+1,y;" "
 160 LET y=y+1: LET p=p+1
 170 IF p<(LEN a$+1) THEN GO TO
120
 180 STOP
```

A bluffers' guide to micros

"TIS PLEASANT, through the loopholes of retreat, to peep at such a world; to see the stir of the great Babel, and not feel the crowd". Whatever William Cowper was writing about in his 18th-century poem *The Task*, it might just as well have been computer languages, because this is something that micro users talk about a lot, but never actually do. It is thus an area wide open to bluffing.

Everybody uses Basic, which is supposed to stand for Basic All-purpose Symbolic Instruction Code. Worldly-wise micro cynics always grin and maintain they have it on personal authority from John Kemeny that he invented what the acronym stood for a long time after he invented the acronym — probably during some after dinner game played by academics at Dartmouth College, USA, back in 1960. Basic programs are just long lists of lines made up of two things: a line number and a series of statements.

Six sorts of statement go into Basic programs: assignment statements which set up a variable or manipulate it in some way, input/output statements which deal with the peripherals, like the screen or the printer, control structures like the famous Goto If or Gosub statements, plus statements related to graphics and sound, error detection — and, just in case I've forgotten something, miscellaneous. Languages which everybody talks about but never use include — Forth, Pascal, Lisp, Prolog, Logo. These are just the ones available in some form on microcomputers. More of this later, since the dedicated microbluffer must first be made aware of the dangers inherent in the break-out of a Basic skirmish, because this is the language everyone uses.

Just as God confounded the speech of men when they attempted to build the Tower of Babel to reach heaven, so Basic has been fractured into many dialects as a divine punishment for giving computing power to the little man instead of leaving it safely in the hands of big business, academic researchers and military intelligence.

Obedient to the principle of divide and rule, small knots of micro-hackers can be found arguing heatedly in their high-level human languages about the advantages of their Basic.

When Kemeny and Kurtz, the famous Dartmouth College double act, invented Basic routines, they revolutionised computer programming by doing away with having to assemble programs on punched cards, giving them to the machine and leaving it to extrapolate wildly from your initial error-strewn program until producing results of no use to anyone.

Now, instead of leaving the machine to single-handedly improvise from the original, or "batch program", you could join in and actually interfere with the program while it was going wrong. This is known as "real time" or "interactive" programming, and since the purpose of Basic was to allow non-programmers to program, you can imagine that the capacity for error must have been greatly enhanced.

There are several "standard" Basics. Computer languages spread rather like diseases, so that the dominant form is usually the most virulent, communicable or "portable" language, but not necessarily the most pleasant to experience. Microsoft Basic is thus generally regarded as a standard Basic because it is the most widely used, rather as engineers still end up using Fortran rather than Pascal, due to the company not wanting to spend any more money on systems development.

The American National Standards Institute spent 10 years developing a standard Basic, so it could carry out the natural function of such organisations, i.e., go around telling everyone that the standard universally adopted in the meantime was all wrong. It allows long variable names and is very structured; like most extended Basics it starts to look like another language — in this case, Pascal, a very structured programming language developed by Swiss professor, Niklaus Wirth. About the only home computer you might encounter this admittedly powerful language on, is the Enterprise — its IS-Basic is closely related to the ANSI version.

Another Basic which owes a lot to Pascal is BBC Basic. BBC owners are quietly smug about the speed of their Basic. Detractors will point out that it is highly non-standard. The BBC owner will take this as a compliment. His language has powerful commands like Repeat-Until, which you don't find on your common or garden Spectrum. People who say that BBC Basic's VDU commands aren't very elegant had better make sure they aren't struggling with an overheated power pack, aerial and cassette leads, whilst frantically looking for a mains adaptor, when they say this. BBC owners are patrician, cool. Not for them the troglodyte scrabbling of the cheapskate Spectrum owner.

The gruff, bluff Commodore 64 owner is liable to be a little spiky if the topic of Basic comes up. The strength of his machine is hardware; its language is Neanderthal. It uses the raw, ungraded old PET Basic of Commodore's early machines. The sprite graphics are a considerable improvement on the Vic-20, but a real micro-snob will remember to sneer at the fact you have to access them with Poke statements.

An Atari user would make mincemeat out of him. Both of their languages are descended from Microsoft, MBasic for

(continued on page 89)

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(continued from page 87)
short. But until the C-16, graphics and sound commands were notably absent from Commodore Basic.

Having compared Basics, micro buffs can then bicker about the way they use it.

There is a fanatical hard core who insist that programs must be structured. Structuring a program is a way of making it less interesting. Instead of a fascinating tracery of Goto statements endlessly looping and recurring like smoke trails at an air-display, the idea is to construct the program out of "modules".

This makes the program easy to edit and, worse, it makes it easily understandable to other programmers. If these people had their way, a bloody crusade would be waged against the Goto statement. They have misunderstood the true spirit of computing and are very dangerous men — not so much programmers as pogrommers.

Paul Bond.

BEGINNERS first bytes

Round the disc maze

SINGLE SIDED, double sided, double density, formatted, unformatted, 40 track, 80 track — these are just some of the terms used to describe discs and disc drives. Not surprisingly the newcomer often feels more than a little bewildered. So in this follow-up to May's introduction to discs we aim to set you straight on basic disc vocabulary. Most of the terms described here refer to 5¼in. discs, which are still the most popular size on home micros.

First, the drives themselves. Most of them can only handle a fixed number of disc tracks, so a 40 track drive cannot read an 80 track disc. They are also either single or double sided. Unlike the 3in. variety 5¼in. discs cannot be turned over but require a drive with two opposing read/write heads if both sides are to be used.

These considerations apart 5¼in. drives are generally not configured for specific disc operating systems and can often be interfaced to a variety of different machines. Thus Opus, Kempston and Cumana all supply interfaces which allow BBC drives to be run on the Spectrum. You can also add a 5¼in. drive to the Amstrad disc system as a second drive.

As for the discs, most are suitable for any disc system despite the information given on their labels. Manufacturers commonly produce all 5¼in. discs as double sided and double density. The only difference between those discs which are sold for 80 track double density operation and those for single density 40 track is that the latter are subjected to less rigorous quality control.

For example discs are described as 96 TPI — tracks per inch — or 48 TPI. Although the latter are usually formatted to give 40 tracks they can generally also be used as 80 track discs.

In single density mode data is interspersed on the disc with synchronisation bits which serve to keep the timing of the disc head up to the mark. By dispensing with synchronisation bits double density systems manage to store twice as much data as single density. The quality of the disc itself and the sensitivity of the drive is therefore much more critical. But whether a disc system runs double or single density rests largely on the disc interface and not the drive mechanism.

Discs arrive from the manufacturer in a blank unformatted state. It is then up to the user to format the disc for a particular operating system. Formatting determines how many tracks a disc has, how data is stored in sectors on each track, which tracks are allocated to the disc directory, and how many entries the directory can take.

The size of the directory limits the number of files — whether programs or data — that can be stored on the discs. Thus the BBC Disc Filing System gives 40 track discs a maximum of 32 files, while Commodore drives allow 144 files on 35 tracks.

Simon Beesley.

Pythonesque pokes — creating an arcade game

WHICHEVER MICRO you own and however much the makers may boast that its Basic runs faster than others, the fact is that you'll always be faced with something of a compromise when writing arcade-style games. Basic is a friendly language, but it's one that executes in a drawl.

Yet, as you can discover for yourself with a little experimentation, it is possible to shift individual characters and objects constructed from your micro's alphanumeric or graphic set around the screen with impressive speed — provided you use Print statements to do so.

Only problem is, games often require constant Peeking of different screen locations to suss out what's happening there, and combining active Print elements with frequent Peeks, and even the occasional Poke, can leave you with a program that runs slower than a Sinclair C5 on a dud torch battery.

Thankfully, though, there is a way of achieving acceptably fast screen movement using Pokes exclusively. It's just a matter of observing the golden rule of declaring as many fixed-value variables as you can right at the start of your program, so that subsequent sections of it can use this silicon shorthand as a short cut to faster execution.

If you'd like to refresh your memory as to the fundamentals of screen movement, animation and the use of Peek and Poke, you'll find these explained in the June and July issues of *Your Computer*.

Rather than spend too much time theorising, let's get right down to keying in a program that makes good use of Peek and Poke: on the CBM-64 it's cloned from that arcade classic in which you control a centipede or snake which has to be moved around the screen gobbling objects while avoiding hazards — not least, it's own body.

```
10 PRINT"{CLR SCREEN}S";
   :P=-1:L=0:D=5
20 IF SC>HI THEN HI=SC
30 SC=0
40 S0=1601:S1=S0+1:S2=S1+1:
   S3=S2+1:S4=S3+1
50 S5=S4+1:S6=S5+1:S7=S6+1:
   S8=S7+1:S9=S8+1
60 PRINT"     HI-SCORE"HI: FOR
   D=1 TO 1500:NEXT
70 POKE S0,56:POKE S1,37:POKE
   S2,37:POKE S3,37:POKE S4,37
80 POKE S5,37:POKE S6,37:POKE
   S7,37:POKE S8,37:POKE S9,37
90 :
100 REM MAIN LOOP
110 PRINT"{CLR SCREEN}"
120 L=0
130 D=D+5
140 FOR I=1 to D:X=INT(RND(1))
    *900)+41
150 IF PEEK(1103+X)<>32 THEN
    X=INT(RND(1)*900)+41:
    GOTO 150
160 POKE 1103+X,90:NEXT
170 TI$="000000":GOTO 280
180 J=PEEK(56320)
190 IF J=126 THEN P=-40
200 IF J=125 THEN P=40
210 IF J=123 THEN P=-1
220 IF J=119 THEN P=1
230 S9=S8:S8=S7:S7=S6:S6=S5:
    S5=S4:S4=S3:S3=S2:S2=S1:
    S1=S0:S0=S0+P
240 REM CHECK COLLISON
250 IF PEEK(S0)=90 THEN SC=
    SC+10:PRINT"SCORE"SC:
    L=L+1:IF L=D THEN 120
260 IF PEEK(S0)=90 THEN
    GOTO 280
270 IF PEEK(S0)<>32 THEN
    GOTO 10
280 POKE S0,56:POKE S1,37:
    POKE S9,32
290 REM SCORE/TIME UPDATE
300 PRINT"SCORE{24 SPACES}
    TIME "TI$
310 IF TI$>"000060" THEN PRINT
    "{CSR HOME}{8 SPACES} TIME
    EXPIRED! SCORED"SC:STOP
320 GOTO 180
```

This listing will work as it is on the Commodore 64, and on other micros with just one or two changes. In line 40, the value 1601 awarded to SO is the screen memory address that will place the snake's head — and the rest of his body will follow — near the centre of screen. The values 56 and 37 which crop up in lines 70 and 80 are the 64 screen codes for the figure 8 and percentage sign respectively.

In lines 140 and 150 you may use a different syntax to set the randomiser which peppers diamonds over the playfield.

Lines 180 and 190 make the snake move up, down, left or right under the control of a joystick; alter as necessary. On the 64, if you don't have a joystick you can

PEEK(197)

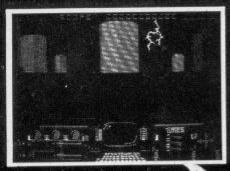
As you'll see when you play this simple demo, the "chaining" of Pokes in lines 70 and 80, and their updating in line 230, produces a surprisingly smooth — if not totally slinky — and automatically synchronised screen movement of no fewer than 10 different characters.

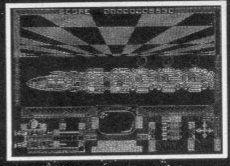
The snake wraps round — moving up or down a line depending on direction — the edges of the screen, but take him off the top, or try to have him double back on his body, and the game resets.

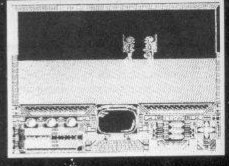
Line 310 gives you just 60 seconds to eat all the diamonds; beat the clock and the game resets with even more targets. The score feature gives you 10 points for every diamond taken and line 20 keeps a tally of your best effort.

This program has been kept to its bare essentials to make it easy for you to study its structure — especially the use of Peek and Poke. Once that's clear to you, you could add a few bells and whistles in the form of colour, sound effects, additional playfield obstacles, and perhaps user-defined characters to produce a more convincing snake!

John Ransley.







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TOP★TIPS

BREAKTHROUGH

During the production and testing of machine-code programs I have often accidentally caused my Spectrum to stick itself in an infinite loop, against which the Basic Break command will prove quite useless.

This program for either the 16k or 48k Spectrum solves this problem. By running the program before you test a machine-code subroutine or program, it will put the Spectrum into interrupt mode two (IM2). In this mode the machine will not only perform an RST566 instruction each time an interrupt occurs, but will also execute the short machine code program which will check whether or not the Break key has been pressed. If the test should prove positive it will return the machine to interrupt mode one (IM1).

Once the program loader has been entered and run, it will automatically put the program above Ramtop and execute it. Once the Break key has been pressed however, the machine must be placed back into interrupt mode two by entering the line

RANDOMIZE USR 32377.

Edmund Ward.

```
  5 REM Prog*as Loader
  10 DATA 255,243,245,229,62,127,219
 ,254,127,203,79,40,19,62,254,219,
 254,127,203,79,40,11,225,241,251,
 237,94,201,225,241,251,237,71,25
 1,201
  50 LET B=32344
  60 READ A: POKE A,A: FOR I=32340 TO 32
 376: READ A: POKE I,A: NEXT I
  70 RANDOMIZE USR 32377
```

SEARCHER

This is a routine which can be used to know what programs are loaded in a cassette, what kind of programs are, and the memory they employ. The routine runs on a CBM-64, and it's stored at C000 hex (49152 decimal). It uses some of the Rom and Kernel routines.

Once the program is typed, you must run it to store the data in memory.

When you want to know the content of a cassette, you must call this routine by typing SYS 49152.

Manuel Garcia Alvarez.

```
10 REM RAM PROGRAM SEARCHER BMB
20 REM BMB BY MANUEL GARCIA BMB
30 REM ALVAREZ BMB 1984 BMB
40 FOR FROM=177 TO 255:READ:NEXT:REM NEEDED DMBJ POKES 2.2 WEC!
50 FROM=177:POKE FROM,0:POKE 1,FROM:REM DMBJ
60 PRINT"{CLR}{WHT}{RVS}SEARCH IN DATA STATEMENTS" {LGRN}
70 DATA 169,
80 DATA 141,144,3,141,145,3,141,180,3,141,181,3,141
90 DATA 141,182,3,141,183,3,141,184,3,141,185,3,141
100 DATA 141,186,3,141,187,3,141,188,3,141,189,3,141
110 DATA 141,190,3,141,191,3,141,192,3,141,193,3,141
120 DATA 141,194,3,141,195,3,141,196,3,141,197,3,141
130 DATA 141,198,3,141,199,3,141,200,3,141,201,3,141
140 DATA 141,202,3,141,203,3,141,204,3,141,205,3,141
150 DATA 141,206,3,141,207,3,141,208,3,141,209,3,141
160 DATA 208,141,96
```

RESPONSE *Frame*

Do you have a problem related to your micro? Tim Hartnell will do his best to help. Please include only one question per letter and mark it "Response Frame". Alternatively, perhaps you have an idea you'd like to pass on to others. Why not write to us with your top tips?

STOP REPEAT

■ I have a friend who owns a Commodore 64. Unfortunately, he is quite severely disabled as he suffers from *Freidrich's Ataxia,* which affects his co-ordination. He was hoping to be able to use his computer as a word processor in place of his electronic typewriter. Unfortunately, he has found that when he attempts to use the computer in this way, the keyboard is too sensitive, and he gets multiple responses from the keys. I would be interested to learn if there is anyway he might overcome this problem.

Albert Hunt,
Stafford.

I DO NOT know which word processing program you are using with the 64. However, if it allows you to do some modifications in Basic, it might be useful to put a small routine like the following at the point in the program which allows input from the keyboard. This routine simply ignores any duplicate key presses, so it will not give multiple responses.

If, however, more than one press of a similar key is needed at a time — as for double letters in words — a seldom-used key — I've chosen the %, but you may have one which is more suitable — needs to be struck between the key presses needed for the double letter.

The letter which is 'passed on' to the word processor is in the variable Q$, while the routine also uses P$.

```
10 P$=""
20 Q$=INKEY$
30 IF Q$="" THEN 20
40 IF Q$="%" THEN P$="":GOTO 20
50 IF Q$=P$ THEN 20
60 P$=Q$
70 REM NOW Q$ IS USED TO 'HAND ON'
80 REM KEY PRESS TO PROGRAM ITSELF
90 PRINT Q$;
100 GOTO 20
```

CLEAN SCREEN

■ I have written several games for the Spectrum, in which I load a complete picture (saved as Screen$) into the computer, so it can sit there while the main program is loading. However, I don't want the loading message of the second program to obliterate part of the picture which is on the screen. I know I can overcome this, to some extent, by controlling the Ink and Paper colours of the loading message, but this puts some restriction on the original Screen$ picture. Is there a better way?

Arnold Thrimble,
Cirencester.

STEVEN DEMPSTER of Littleworth, Stafford, has discovered a very good way of solving this problem. To stop the file-name from obstructing your Screen$, first Peek 23570. Note down the answer you get. Next, type in Poke 23570,16. After the Screen$ has loaded, Poke 23570 with the original number.

ZX PRINTER OK?

■ I own a Spectrum and am thinking of buying a new, or second hand, ZX Printer. Some of my mates say that Sinclair aren't making it any more. If it is not being sold any more, will I be able to get extra paper for it?

Paul Taylor,
Sittingbourne,
Kent.

THE ZX Printer has been discontinued, although independent suppliers are still producing paper for it. The *Alphacom 32* has almost totally supplanted the ZX Printer, and most Sinclair stockists also handle the *Alphacom.*

This produces blue or black (depending on the paper you buy) printing, and is far more consistent in its output than the ZX Printer ever was.

BENCHMARKS

■ When looking through magazines with reviews in them, including *Your Computer,* I quite often see a section showing 'Benchmarks, 1 to 8'. Could you please tell me what these mean, and how they are timed?

D Macroe,
Morpeth,
Northumberland.

BENCHMARKS ARE a set of standard tests which try out a function or functions of the computer under test, producing a measurable result which can be compared, to some extent, with the results of running the same tests on another computer.

The 'standard' eight benchmarks were introduced back in 1977 by the American magazine *Kilobaud.* While they are not particularly rigorous, they do offer a quick and simple solution to the problems of checking out how well the computer performs particular arithmetic functions.

The first bench mark simply runs an empty For Next loop from 1 to 1000, and times it. In the second test, a variable is set to zero, then incremented by one over and over again until it reaches 1000.

In the third test, a small bit of arithmetic is added within the program, using variables. Test four does the same thing as test three, except numbers are substituted for the variables. A "dummy" subroutine call (that is a call just to the word Return) is added in test five.

As you can see, each test demands a little more of the computer, and gives results which can be compared with the results obtained from running the tests on other machines.

DATA TRANSFER

■ I have recently changed from a ZX Spectrum to an Amstrad, and am having trouble transferring some of my programs. On the Spectrum, all the current variables and arrays are saved when the program is saved. This meant that, on reloading, it was possible to set off again from the same point, adding information to the array and variable data loaded in from the cassette. — provided, of course, Goto was used rather than run. This does not work on the Amstrad using the standard Save and Load commands. Is there a way of saving and loading current variables and array information on the Amstrad?

Brian Paget,
Aberdeenshire.

UNFORTUNATELY, there is no way of doing this on the Amstrad which is as simple as that provided on the Spectrum. The best way to achieve this on the Amstrad is to open a cassette file, and save the date to that, load in the data from tape after the main program has loaded in.

The command Openout "filename" opens an output file onto cassette for use with the current program in the computer's memory (see page 8-31 of the Amstrad manual). The program creates the first block of data, in the file with the given name. Each block consists of up to 2048 bytes of data.

A New command will abandon any open file buffered, and any data will be lost. The "opposite" command is Openin, which opens an input file from the cassette which contains information for use in the current program in your Amstrad's memory.

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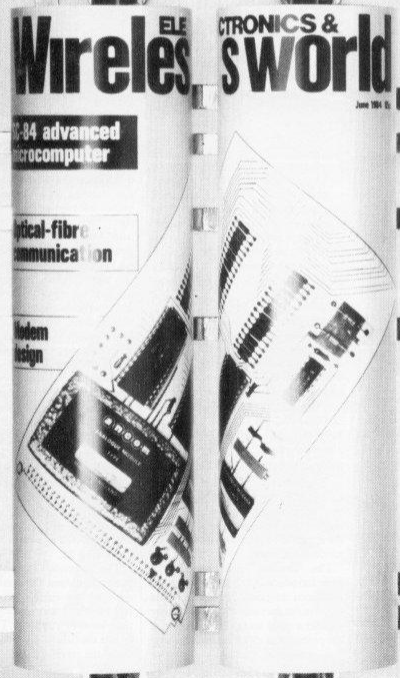

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SOFTWARE File

Programs for Software File should be fairly compact and sent on a cassette. Please include clear instructions and say what computer it's for. We pay between £6 and £36 for programs published. They must be double-checked and submitted

Carrots from space

David Green,
Wye
Kent.

Spectrum

WHILE RECOVERING from the sheer boredom of typing in over 5K of machine code, I resolved to write a 48K Spectrum game that would be fast, fun to play, well-endowed with sound effects and that would contain less than 1.5K of machine code. Despite its unbelievably silly title, this is that program.

The game is based on the slightly improbable situation that entire battle fleets of alien telekinetic carrots, with world domination their intent, have been temporarily trapped in freak wormholes in the space/time continuum, and someone has to go in there to turn the evil vegetables into so much mangled cellulose. The only method known to science of destroying these extra-terrestrial tubers is that of skilfully placing time bombs in their path, but it is best to do this only when you are moving, as otherwise it is all too easy to blow yourself up.

Convincing your computer to take part in this wanton slaughter is relatively straightforward. The recommended procedure is as follows:

Type in listing 1 and save it. This bit sets up the graphics, the title page, and various other things of dubious artistic value.

Type in the hexloader in listing 2 or load a suitable one from tape. No self-respecting Spectrum user should be without one. Enter.

```
CLEAR 31999
```

and then type in the machine code from listing 3 using the hexloader. Save it as:

```
SAVE "from" CODE 33000,1300
```

Type in the imaginatively-titled listing 4. This actually controls the game and plays the music. Save it when you've finished and then reload from the beginning when you want to play it.

The game should work first time, but if it doesn't, check the machine code in listing 3 and the Poke's and USR calls in listing 4.

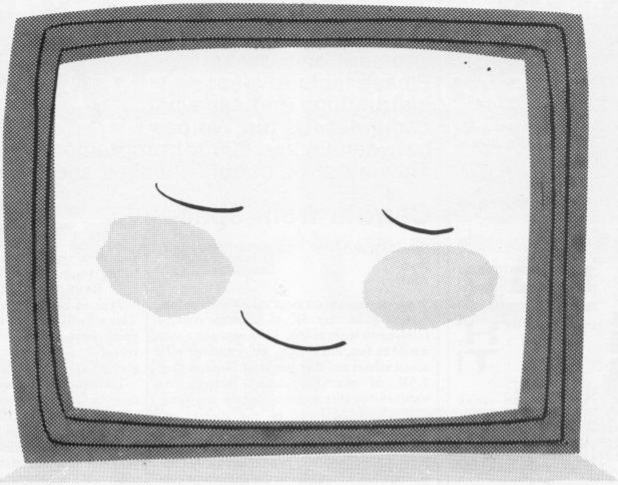
Full instructions on how to select any particular game configuration are given in the program. It would be quite easy to add a high score table by adding a few short routines to listing 4, including one at around line 320 that would use the Screen$ function to find out what the score was after every game, but that is up to you. Anyone with a disassembler might like to know what the first 200 bytes of code do, since this is not very obvious, and this is in fact a collection of subroutines which handle printing to the screen etc.

If you don't like using the cursor keys, the part of the code which deals with the bombs is from 33520 onwards, and the section which controls movement is from 33630 onwards. These articles usually end with a heartfelt plea to send cheques or postal orders to the author, but as this program has been made as short as possible, this should not be necessary.

Listing 1.

```
  50 INK 7: PAPER 0: BORDER 0: C
LEAR 31999
  60 DATA 231,165,255,24,255,24,
102,231,36,24,60,a,a,24,a,a
  70 DATA 24,a,a,60,a,a,24,36,0,
0,184,127,a,184,0,a
  80 DATA 0,a,29,254,a,29,0,a,25
4,130,178,170,154,130,254,0
  90 DATA 254,206,238,a,a,198,25
4,0,254,130,250,130,190,130,254,
0
 100 DATA 254,130,250,130,250,13
0,254,0,254,174,a,130,238,a,254,
0
 110 RESTORE : FOR n=USR "a" TO
USR "j"+7: READ a: POKE n,a: NEX
T n
 120 FOR n=USR "t" TO USR "u"+7:
POKE n,127+(127 AND n>=USR "u")
: NEXT n
 130 LET a$="TOTAL  WIPEOUTKill
bonus"
 140 FOR n=1 TO 25: POKE 34999+n
,CODE a$(n): NEXT n
 150 REM Now you should set up
     the UDG's by typing RUN
 160 PRINT ""
     "
 170 PRINT "  T▇UT▇UT▇UT▇UT▇U
UT▇  T▇▇U     T     UT    T    T
 UT    T     T  T▇▇UT    T    T
 UT    T▇U   T    UT    T    T▇
 UT▇UT▇UT▇U"
 180 PRINT AT 14,"from"
 190 PRINT ""  T▇UT▇UT▇UT▇U
T     UT    T  T▇UT▇UT▇UT▇U
T     UT    T  T▇UT    T    T
T     UT    T  T▇UT    T    T
T     UT    T  T▇UT    T    T
```

Has anyone ever told you...



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YOUR COMPUTER

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(continued from page 93)

Listing 4.

```
33000  00000000000000A48 = 130
33008  8CC6B82465CCDB5 = 895
33016  0C9A0E2F8B9A3A3 = 940
33024  810640C5D5F8E18 = 861
33032  8A6779DE61F6F7B = 1126
33040  07C827CB27CB27C8 = 936
33048  27CB27C8E7D1C129 = 1176
33056  C5D51B0B8B0B9AF = 706
33064  1B13C8E1F9F1B9F = 741
33072  8B9F1D1C1C9C5D5 = 1115
33080  E8F9C8E1B9F1B9D5 = 1
33088  77CD0B1E7B2B100 = 636
33096  3DF2B0C7F2B1104 = 779
33104  D5901B02D5B2BF1B = 747
33112  0B0B0AF7E2D2B1A = 527
33120  10F91D10B07E1A = 657
33128  1214D9F8D1C1C1A = 1149
33136  C5D5E52105B07E3C = 991
33144  FD8C5B8B8B1B1B = 1
33152  F577D6D6D6D2C5 = 448
33160  D8D2D6D6D6D2C5 = 1
33168  8D5C7EC63C5D6E5 = 669
33176  D1D02D2D2D2D2D = 295
33184  F12B5D5C1D1C1C9 = 1352
33192  D5D2D5D5D5D5C7E3 = 9
33200  8D72B73757CE61F = 673
33208  7F2B0JHF7E1D2B1A = 840
33216  7B62DF5F9D03C5 = 921
33224  0D2C5F21D1A = 607
33232  0DC0E5D5C110F311 = 858
33240  0DC0E5F8D1C1C1DE = 1185
33248  F12D2D11541D6C5 = 403
33256  F12D2D11541D6C5 = 1
33264  B5D3E1C113E8D5E5 = 1314
33272  1D1D9D9D9D9D9D9 = 1
33280  E8C11D5E21D0B0D6 = 1
33288  0636D3210F3EE3 = 427
33296  2B8B8DF3B9B9C5 = 608
33304  D1D1D1D1D1D1D1D1 = 1
33312  8D8D3D3C7C8B8B1B = 718
33320  8D8D3D3C7C8B8B1B = 1
33328  8C9F8D8D3D3C7C8B = 1
33336  8C9F8D8D3D3C7C8B = 1
33344  D9C8D8D8D8D11A0 = 506
33352  D9C8D8D8D8D11A0 = 1
33360  DDFA8D1F4810F9A = 1
33368  DDFA8D1F4810F9A = 1
33376  8F3212D9CD8B5E1E = 1105
33384  8F3212D9CD8B5E1E = 1
33392  8D3D6C3D8D9D1B1A = 829
33400  8D3D6C3D8D9D1B1A = 1
33408  8D8F7F8D1D2D2D8 = 870
33416  8D8F7F8D1D2D2D8 = 1
33424  D1C9C5D8D8B1C8E1 = 1199
33432  D1C9C5D8D8B1C8E1 = 1
33440  1FFE1E3B7371D6D = 691
33448  1FFE1E3B7371D6D = 1
33456  8D1EFF1E1B0B0D2C5 = 541
33464  8D1EFF1E1B0B0D2C5 = 1
33472  1B01C8B8D1C8B7B8 = 863
33480  1B01C8B8D1C8B7B8 = 1
33488  B1B7B0F0C7D8B3C2 = 1297
33496  B1B7B0F0C7D8B3C2 = 1
33504  72D5E5D1D2D0D1D3 = 1
33512  72D5E5D1D2D0D1D3 = 1
33520  B1C1D1D1D1D1D1D1 = 1
33528  B1C1D1D1D1D1D1D1 = 1
33536  FE0C47C5E8D3D1E4 = 1080
33544  FE0C47C5E8D3D1E4 = 1
33552  8D2D2D8D8D8D6D6 = 818
33560  8D2D2D8D8D8D6D6 = 1
33568  8DC6D8D8D8D1C1D5 = 1
33576  8DC6D8D8D8D1C1D5 = 1
33584  D5D0D1D1D1D1D1D1 = 1
33592  D5D0D1D1D1D1D1D1 = 1
33600  7D0D3A7D1D1D1D1 = 733
33608  7D0D3A7D1D1D1D1 = 1
33616  7D3D8D8D8D8D8D8 = 1
33624  7D3D8D8D8D8D8D8 = 1
33632  8D8D8D8D8D8D8D8 = 1
33640  8D8D8D8D8D8D8D8 = 1
33648  8D8D8D8D8D8D8D8 = 1
33656  8D8D8D8D8D8D8D8 = 1
33664  8D8D8D8D8D8D8D8 = 1
33672  8D8D8D8D8D8D8D8 = 1
33680  8D8D8D8D8D8D8D8 = 1
33688  8D8D8D8D8D8D8D8 = 1
33696  8D8D8D8D8D8D8D8 = 1
33704  8D8D8D8D8D8D8D8 = 1
33712  8D8D8D8D8D8D8D8 = 1
33720  8D8D8D8D8D8D8D8 = 1
33728  8D8D8D8D8D8D8D8 = 1
33736  8D8D8D8D8D8D8D8 = 1
33744  8D8D8D8D8D8D8D8 = 1
33752  8D8D8D8D8D8D8D8 = 1
33760  8D8D8D8D8D8D8D8 = 1
33768  8D8D8D8D8D8D8D8 = 1
33776  8D8D8D8D8D8D8D8 = 1
33784  8D8D8D8D8D8D8D8 = 1
33792  8D8D8D8D8D8D8D8 = 1
33800  8D8D8D8D8D8D8D8 = 1
33808  8D8D8D8D8D8D8D8 = 1
33816  8D8D8D8D8D8D8D8 = 1
33824  8DFEFCBF3F3F3F3 = 1243
33832  5D5EC5E4D5D5C1D2 = 963
33840  D5D5D5D5D5D5D5D5 = 1
33848  D5D5D5D5D5D5D5D5 = 1
33856  D5D5D5D5D5D5D5D5 = 1
33864  D5D5D5D5D5D5D5D5 = 1
33872  D5D5D5D5D5D5D5D5 = 1
33880  FE8D1D1C7D1D1D1D1 = 1
33888  FE8D1D1C7D1D1D1D1 = 1
33896  D5D5D5D5D5D5D5D5 = 1
33904  D5D5D5D5D5D5D5D5 = 1
33912  D5D5D5D5D5D5D5D5 = 1
33920  D5D5D5D5D5D5D5D5 = 1
33928  D5D5D5D5D5D5D5D5 = 1
33936  D5D5D5D5D5D5D5D5 = 1
33944  D5D5D5D5D5D5D5D5 = 1
33952  D5D5D5D5D5D5D5D5 = 1
33960  D5D5D5D5D5D5D5D5 = 1
33968  D5D5D5D5D5D5D5D5 = 1
33976  D5D5D5D5D5D5D5D5 = 1
33984  D5D5D5D5D5D5D5D5 = 1
33992  D5D5D5D5D5D5D5D5 = 1
34000  D5D5D5D5D5D5D5D5 = 1
34008  D5D5D5D5D5D5D5D5 = 1
34016  D5D5D5D5D5D5D5D5 = 1
34024  D5D5D5D5D5D5D5D5 = 1
34032  D5D5D5D5D5D5D5D5 = 1
34040  D5D5D5D5D5D5D5D5 = 1
34048  D5D5D5D5D5D5D5D5 = 1
34056  D5D5D5D5D5D5D5D5 = 1
34064  D5D5D5D5D5D5D5D5 = 1
34072  D5D5D5D5D5D5D5D5 = 1
34080  D5D5D5D5D5D5D5D5 = 1
34088  D5D5D5D5D5D5D5D5 = 1
34096  D5D5D5D5D5D5D5D5 = 1
34104  D5D5D5D5D5D5D5D5 = 1
34112  D5D5D5D5D5D5D5D5 = 1
34120  D5D5D5D5D5D5D5D5 = 1
34128  D5D5D5D5D5D5D5D5 = 1
34136  D5D5D5D5D5D5D5D5 = 1
34144  D5D5D5D5D5D5D5D5 = 1
34152  D5D5D5D5D5D5D5D5 = 1
34160  D5D5D5D5D5D5D5D5 = 1
34168  D5D5D5D5D5D5D5D5 = 1
34176  D5D5D5D5D5D5D5D5 = 1
34184  D5D5D5D5D5D5D5D5 = 1
34192  D5D5D5D5D5D5D5D5 = 1
34200  FE1E4D2D5D5C1D5 = 1
34208  FE1E4D2D5D5C1D5 = 1
34216  0B3D0D0D3C1D0D0 = 651
34224  0B3D0D0D3C1D0D0 = 1
34232  0D0D1D1D5D5D5D5 = 1
34240  0D0D1D1D5D5D5D5 = 1
34248  01D0E1D0E0D1D0D0 = 636
34256  01D0E1D0E0D1D0D0 = 1
34264  51D3D1C1D8F3E1D = 859
34272  51D3D1C1D8F3E1D = 1
34280  0DC0E5D3D3D2D2D = 803
34288  0DC0E5D3D3D2D2D = 1
34296  00 = 0
```

Double height

M K Mostowyj
Bretton Estate,
Peterborough.

Amstrad

THIS IS A utility program for the Amstrad CPC-464. It will give you access to a double height character set similar to that found on the BBC micro. The program provides Basic with two new commands by using the RSX capability of the Amstrad. The two new commands are Top and Bat. Anyone familiar with the BBC will know that to print in double height in Mode 7 two lines must be used, e.g.:

10 PRINTTAB(1,10);CHR$(141),"This is an example"
20 PRINTTAB(1,11);CHR$(141),"This is an example"

The second line is printed one line lower than the first and CHR$(141) informs the BBC that double height is required. My version for the Amstrad works in a similar way. Any string that already exists in your Basic program can be printed in double height. The syntax is as follows.

1TOP,@a$ (This prints the top line as in line 10 above)
1BOT,@a$ (This prints the bottom line as in line 20)

The words Top and Bot must be preceded with the 1 symbol, this is the shifted @ key. Both words must then be followed directly by a comma and the @ symbol then the string to be printed, a$ is used in the example but in fact any string can be used as long as it exists. Also the top and bottom halves of the double height characters can have different Pen and Paper colours, e.g.:

10 X$ = "QWERTY"
20 LOCATE 1,10:PAPER 1:PEN 2:
1TOP,@X$
30 LOCATE 1,11:PAPER 2:PEN 3:
1BOT,@X$

Any character from 32 to 126 can be printed using this utility and it can be used in any mode. The only restriction is that the string to be printed must not exceed the screen width e.g. 80 characters in Mode 2, 40 in Mode 1 and 20 in Mode 0.

To enter the program simply type in listing 1 and run it. The data in line 250 is poked into memory first. This is not in fact part of the finished program but is a small machine code routine that transfers a copy of the original character set to a different part of memory thus saving you having to type in an extra 760 bits of data. Once this is completed the data containing the new character sets — one for the tops and one for the bottoms — and the machine code that supplies the two new commands is poked into memory. If all is well the new commands are logged on and a message is printed using the new facility.

To save the resulting code use

SAVE "D/H.BIN",B,38200,2371

To reload it either type as a direct command or as the first line of your own program

SYMBOL AFTER 0:MEMORY &9537:LOAD"!":CALL &9E20

```
10 :"*****************************"
20 :"BASIC LOADER FOR DOUBLE HEIGHT"
30 :"          BY  M.K.MOSTOWYJ"
40 :"              MAY 1985"
50 :"*****************************"
60 SYMBOL AFTER 0:MEMORY &9537
70 RESTORE 250
80 MODE 1:PRINT"PLEASE WAIT!!"
90 FOR A=&7530 TO &753B
100 READ X$:POKE A,VAL("&"+X$)
110 NEXT
120 CALL &7530
130 CH=0
140 FOR A=&9B30 TO &9E7A
150 READ X$:POKE A,VAL("&"+X$)
160 CH=CH+VAL("&"+X$)
170 NEXT
180 IF CH<>96418 THEN CLS:PRINT"ERROR
IN DATA":END
190 CALL &9E20
200 CLS
210 A$="Routine now in memory and logg
ed on."
220 !TOP,@A$
230 !BOT,@A$
240 END
250 DATA 21,00,A5,11,38,95,01,F8,02,ED
,B0,C9
260 DATA 00,00,00,00,00,00,00,00,00,00
,18,18,18,18,18,00,66,66,66,66
270 DATA 00,00,00,00,36,36,7F,7F,36,36
,00,00,08,08,7E,48,7E,00,00,71
280 DATA 53,76,0C,18,00,00,38,7C,6C,6C
,38,30,18,18,18,30,60,00,00,00,00
290 DATA 0C,18,30,30,60,60,00,00,30,18
,0C,0C,06,06,00,00,00,00,66,24,18,7E
300 DATA 00,00,00,00,18,18,18,7E,00,00
,00,00,00,00,00,00,00,00,00,00
310 DATA 00,7E,00,00,00,00,00,00,00,00
,00,00,00,01,03,06,0C,18,00,3D,7E,66
320 DATA 66,66,6E,6E,00,18,38,78,18,18
,18,18,00,3C,7E,66,66,06,06,0C,00,3C
330 DATA 7E,66,66,06,06,1C,00,0C,1C,1C
,3C,3C,6C,6C,00,7E,7E,60,60,60,7C,7E
340 DATA 00,3C,7E,66,60,60,7C,7E,00,7E
,7E,06,06,06,0C,18,00,3C,7E,66,66,66
350 DATA 7E,3C,00,3C,7E,66,66,66,66,66
,00,00,00,00,00,18,18,18,00,00,00,00
360 DATA 00,00,00,00,00,00,00,00,0C,18
,30,60,00,00,00,00,00,7E,7E,00,00,00
370 DATA 00,00,30,18,0C,06,00,3C,7E,66
,66,66,0C,18,00,00,3C,7E,42,5E,5E,5E
380 DATA 00,3C,7E,66,66,66,66,7E,00,7C
,7E,66,66,66,7E,7C,00,3C,7E,66,66,60
390 DATA 60,60,00,78,7C,6E,66,66,66,66
,00,7E,7E,60,60,60,7C,00,7E,7E,60
400 DATA 60,60,60,7C,00,3C,7E,66,66,60
,60,60,00,66,66,66,66,66,7E,00,3C
410 DATA 3C,18,18,18,18,18,00,06,06,06
,06,06,06,06,00,66,66,66,66,6C,78,78
420 DATA 00,60,60,60,60,60,60,60,60,66
,FF,DB,DB,DB,DB,00,3C,7E,66,66,66
430 DATA 66,66,00,3C,7E,66,66,66,66,66
,00,7C,7E,66,66,66,66,66,00,3C,7E,66
440 DATA 66,66,66,66,00,7C,7E,66,66,66
,66,66,00,3C,7E,66,66,60,7C,3E,00,7E
450 DATA 7E,18,18,18,18,18,00,66,66,66
,66,66,66,66,00,66,66,66,66,66,66,66
460 DATA 00,DB,DB,DB,DB,DB,DB,DB,00,66
,66,66,66,66,7E,3C,00,66,66,66,66,66
470 DATA 7E,3C,00,7E,7E,06,06,0C,0C,18
,00,3C,3C,30,30,30,30,00,00,00,80
480 DATA C0,60,30,18,00,3C,3C,0C,0C,0C
,0C,0C,00,18,3C,7E,5A,18,18,18,00,00
490 DATA 00,00,00,00,00,00,00,00,30,30,18
,0C,00,00,00,00,00,00,00,00,00,78
500 DATA 00,00,00,00,E0,E0,60,60,7C,00,00
,00,00,00,00,00,3C,00,00,00,1C,0C,0C
510 DATA 0C,7C,00,00,00,00,00,00,00,00,3C
,00,00,00,1C,36,36,30,30,00,00,00,00
520 DATA 00,00,00,3E,00,00,00,E0,60,60
,60,6C,00,00,00,00,00,18,00,38,00,00
530 DATA 00,00,00,06,00,0E,00,00,00,E0
,60,60,60,60,00,00,38,18,18,18,18,18
540 DATA 00,00,00,00,00,00,00,6C,00,00
,00,00,00,00,00,DC,00,00,00,00,00,00
550 DATA 00,3C,00,00,00,00,00,00,00,DC
,00,00,00,00,00,00,00,76,00,00,00,00
560 DATA 00,00,00,00,6C,00,00,00,00,00
,00,3C,00,00,00,30,30,30,7C,30,00,00
570 DATA 00,00,00,00,00,66,00,00,00,00
,00,00,00,66,00,00,00,00,00,00,00,C6
580 DATA 00,00,00,00,00,00,00,C6,00,00
,00,00,00,00,00,66,00,00,00,00,00,00
590 DATA 00,7E,00,0E,0E,18,18,18,18,70
,00,18,18,18,18,18,00,70,70,18,18
600 DATA 18,18,18,0E,00,76,76,DB,DB,00
,00,00,00,00,00,00,00,00,00,18,18
610 DATA 18,18,00,18,18,00,00,00,00,00
,00,00,00,00,36,36,7F,7F,36,36,00,00
620 DATA 7E,00,7E,7E,08,08,00,00,00,30,6E
,CA,8E,00,00,00,00,7B,FF,CC,CC,FF,7B
630 DATA 00,00,00,00,00,00,00,00,00,00
,60,60,30,30,18,0C,06,00,06,06,0C,0C
640 DATA 18,30,60,00,18,24,66,00,00,00
,00,00,7E,18,18,18,00,00,00,00,00,00
650 DATA 18,18,18,18,30,60,7E,00,00,00
,00,00,00,00,00,18,18,18,18,00,00
660 DATA 30,60,C0,80,00,00,00,00,00,7E
,66,66,66,7E,BC,00,18,18,18,18,18,3C
670 DATA 3C,00,18,30,60,60,60,7E,7E,00
,1C,06,06,66,66,7E,3C,00,6C,6C,7E,7E
680 DATA 0C,0C,0C,00,06,06,06,66,66,7E
,3C,00,66,66,66,66,7E,3C,00,18,18
690 DATA 18,18,18,18,00,7E,66,66,66
,66,7E,3C,00,7E,3C,06,06,7E,3C,00
700 DATA 00,00,00,00,18,18,18,18,00,18,00
,18,18,18,18,30,60,60,30,18,0C,00,00
710 DATA 00,00,00,7E,7E,00,00,00,00,00
,06,0C,18,30,00,00,00,00,18,18,18,18
720 DATA 00,18,18,00,4E,40,40,40,40,7E
,3C,00,7E,66,66,66,66,66,66,66,66
730 DATA 66,66,66,7E,7C,00,60,60,60,66
,66,7E,3C,00,66,66,66,66,6E,7C,78,00
740 DATA 7C,60,60,60,60,7E,7E,00,7C,60
,60,60,60,60,00,6E,6E,66,66,66,7E
750 DATA 3C,00,7E,66,66,66,66,66,66,00
,18,18,18,18,3C,3C,00,66,66,06,06,66
760 DATA 66,7E,3C,00,7C,6E,66,66,66,66
```

(continued on next page)

(continued from previous page)

```
,66,00,60,60,60,60,60,7E,7E,00,DB,DB
770 DATA DB,DB,DB,DB,DB,00,66,66,66,66
,66,66,66,00,66,66,66,66,66,7E,3C,00
780 DATA 7E,7C,60,60,60,60,60,00,66,66
,66,6E,6E,7E,3F,03,7C,7E,66,66,66,66
790 DATA 66,00,06,06,06,66,66,7E,3C,00
,18,18,18,18,18,18,00,66,66,66,66
800 DATA 66,7E,3C,00,66,66,66,66,7E,3C
,18,00,DB,DB,DB,DB,FF,FF,66,00,3C,7E
810 DATA 66,66,66,66,66,00,18,18,18,18
,18,18,18,00,18,30,30,60,60,7E,7E,00
820 DATA 30,30,30,30,30,3C,3C,00,0C,06
,05,01,00,00,00,00,00,0C,0C,0C,0C,3C
830 DATA 3C,00,18,18,18,18,18,18,18,00
,00,00,00,00,00,00,00,FF,00,00,00,00
840 DATA 00,00,00,00,00,0C,7C,CC,CC,CC,CC
,76,00,66,66,66,66,66,E6,BC,00,66,60
850 DATA 60,60,60,66,3C,00,CC,CC,CC,CC
,CC,CE,76,00,66,66,66,7E,60,60,3C,00
860 DATA 78,30,30,30,30,30,78,00,66,66
,66,66,66,3E,06,7C,76,66,66,66,66,66
870 DATA E6,00,18,18,18,18,18,18,3C,00
,06,06,06,06,66,66,3C,6C,6C,78,78
880 DATA 6C,6C,E6,00,18,18,18,18,18,18
,3C,00,FE,D6,D6,D6,D6,D6,D6,00,66,66
890 DATA 66,66,66,66,66,00,66,66,66,66
,66,66,3C,00,66,66,66,66,7C,60,F0
900 DATA CC,CC,CC,CC,CC,7C,0C,1E,36,30
,30,30,30,30,78,00,60,60,3C,06,06,06
910 DATA 7C,00,30,30,30,30,36,36,1C,00
,66,66,66,66,66,66,3E,00,66,66,66,66
920 DATA 66,3C,18,00,D6,D6,D6,D6,D6,FE
,6C,00,6C,6C,38,38,6C,6C,C6,00,66,66
930 DATA 66,66,66,3E,06,7C,0C,0C,18,18
,30,32,7E,00,70,18,18,18,18,0E,0E,00
940 DATA 18,18,18,18,18,18,00,0E,18
,18,18,18,70,70,00,00,00,00,00,00,00
950 DATA 00,00,01,2E,9E,21,2A,9E,CD,D1
,BC,C9,00,00,2E,9E,36,9E,C3,3D,9E,C3
960 DATA 42,9E,54,4F,D0,42,4F,D4,00,21
,30,98,18,03,21,28,9B,11,00,A5,01,F8
970 DATA 02,ED,B0,DD,6E,00,DD,66,01,7E
,FE,00,28,17,47,23,5E,23,56,EB,7E,CD
980 DATA 5A,BB,23,10,F9,3E,00,CD,5A,BB
,3E,0A,CD,5A,BB,21,38,95,11,00,A5,01
990 DATA F8,02,ED,B0,C9
```

Securdrive

Ansgar Zerpass,
Lehrberg,
West Germany.

Spectrum

THE SPECTRUM Microdrive manual tells you how to save a program or a code or data file in a way that the usual Cat command cannot register it: Save the program or file with a file name starting with CHR$ 0.

This method will protect your programs on Microdrive cartridge from unauthorised access. On the other hand, you will have to learn the protected program names by heart — which will prove to be impossible — or you will have to keep a written list of the names along with your cartridges — which will make the whole protection senseless.

Securdrive is a utility which will store the file names of your protected programs and which allows you to get rid of a written list. Securdrive will be saved on Microdrive cartridge with the autorun facility (. . . Line 1) which makes it unable to break into Securdrive during the loading process or to merge it in order to get hold of the stored program names.

The first operation of Securdrive after loading is the input of a password. A wrong password will cause the system to crash. The right password will cause a list of all protected programs to be shown and will give you the opportunity to load any of these programs by pressing just one key.

Spectrum users should be able to alter Securdrive to handle more than 10 protected file names or to handle protected data files from a commercial file program etc. without much difficulties.

You may use Securdrive with your existing cartridges by saving all existing files and programs with a new, protected name (starting with CHR$ 0) and saving Securdrive on the same cartridge. You will have to initialise Securdrive by entering the protected file names and a password of your choice every time a new protected program has been saved on the cartridge.

Type in listing 1 and save it on any cartridge with

GO TO 9999

and

ENTER

Type in listing 2, the demo program, and enter

GO TO 100

to save this program on the same cartridge with three different names. Then new your computer and load Securdrive. Initialise the program by entering Init as password and entering the three protected demo program file names — DEMO ONE, DEMO TWO, DEMO XXX. Enter any new password and save Securdrive on the cartridge using option two.

Listing 1.

```
9000 REM
        { SECURDRIVE }
       ENGLISH VERSION
   ZX SPECTRUM & M-DRIVE
        © 04.05.1985 by
       Ansgar Zerfass,
       Schlehenweg 10,
        8802  Lehrberg,
        West Germany.
9010 CLEAR #: BORDER 1: PAPER 1:
 INK 7: CLS
9020 PRINT PAPER 5; INK 0;"{ SEC
URDRIVE }  © A.Zerfass 1985"
9030 INPUT PAPER 6; INK 0;"Enter
 the password to access theprote
cted programs or enter INITto en
ter a new list of protectedprogr
ams and a new password :  "; LI
NE I$
9040 IF I$="INIT" THEN GO TO 950
0
9050 IF I$<>C$ THEN PRINT USR 0
9060 PRINT AT 4,6;"Choice of pro
grams :"'"
9070 FOR F=1 TO 10: IF N$(F)="
          " THEN GO TO 9090
9080 PRINT TAB 9;"(";F-(10 AND F
=10);")  ";N$(F): NEXT F
9090 PRINT AT 18,0;"Press the co
rresponding  key  toload a progr
am or press  (C)  tocopy the scr
een to your printer!": BEEP .1,1
9100 LET I=-1: LET I$=INKEY$: IF
 I$="" THEN GO TO 9100
9110 IF I$<"9" AND I$>="0" THEN
LET I=VAL I$+(10 AND I$="0")
9120 IF I>0 THEN IF N$(I)="
          " THEN LET I$="": GO TO 9100
9130 IF I$="C" OR I$="c" THEN CO
PY : LPRINT : LPRINT : LPRINT :
LET I$="": GO TO 9100
9140 IF I<1 THEN GO TO 9100
9150 PRINT #0;AT 1,6;"Loading '"
;N$(I);"'"
9160 LOAD *"M";1;CHR$ 0+N$(I): R
UN
9200 STOP
9500 CLEAR #: DIM N$(10,9): FOR
F=1 TO 10
9510 INPUT "ENTER THE PROGRAM NA
ME  (Max.  9letters; enter END i
f  you  haveentered all programs
):                  "; LINE M$: IF M$=""
 OR LEN M$>9 THEN GO TO 9510
9520 FOR G=1 TO F: IF N$(F, TO L
EN M$)=M$ THEN GO TO 9510
9530 NEXT G
9540 IF M$="END" THEN GO TO 9560
9550 LET N$(F)=M$: NEXT F
9560 INPUT "PASSWORD :  "; LINE
C$: IF LEN C$>20 THEN GO TO 9560
9590 PRINT AT 3,0;"Press"'"(1)
 to save SECURDRIVE on a
 cartridge for the first time"'
"(2) to save SECURDRIVE on a
      cartridge after a"'"      mod
ification"
9600 IF INKEY$="1" THEN GO TO 96
30
9610 IF INKEY$="2" THEN ERASE "M
";1;"SECURDRIVE": GO TO 9630
9620 GO TO 9600
9630 SAVE *"M";1;"SECURDRIVE" LI
NE 1: VERIFY *"M";1;"SECURDRIVE"
: CLS #: PRINT "SECURDRIVE saved
 and verified."'"Password :  ";
C$: PAUSE 0: PRINT USR 0
9999 CLEAR #: LET C$="INIT": SAV
E *"M";1;"SECURDRIVE" LINE 1
```

Listing 2. The demo program.

```
1 REM ########################
      DEMO PROGRAM FOR SECUR-
      DRIVE / PRINTS CHAR-SET
      ########################
```

```
  10 BORDER 0: PAPER 0: INK 6: C
LS : PRINT N$''''
  20 FOR f=32 TO 255: PRINT CHR$
f;: NEXT f
  30 GO TO 9999
 100 FOR F=1 TO 3: READ N$
 110 SAVE *"M";1;CHR$ 0+N$ LINE
1
 120 NEXT F
 130 DATA "DEMO ONE","DEMO TWO",
"DEMO XXX"
```

Fernando

David Cawthray,
Leeds.

BBC

You are Fernando the Flea hopping around a dog when suddenly you leap into a human's hair by mistake. The hair is all tangled and you have to leap from strand to strand searching for some precious objects. There are four levels and it is loosely based around a platform game.

Type in program 1, Run it and correct any mistakes. Save it then press Break, and enter program 2, Run it and correct any mistakes. Save it under "flea" then the two programs are ready. Rewind the cassette and chain program.

Program 1.

```
 110ONERROR CLS:GOTO150
 120REMTITLEPAGE
 130PROCINIT
 140MODE1:VDU23;8202;0;0;0;19,0,4;0;
 150COLOUR1
 160PROCCENTER("D.C.SOFT Presents",2)
 170COLOUR2
 180PROCCENTER("FERNANDO THE".5)
 190PROCCENTER("FLEA",7)
 200PRINTTAB(12,9)"By D.J.Cawthray"
 210PRINTTAB(4,13)"Graphics"
 220PRINTTAB(7,14)"By"
 230PRINTTAB(3,15)"P.Cawthray"
 240PRINTTAB(27,13)"Music"
 250PRINTTAB(29,14)"By"
 260PRINTTAB(26,15)"S.Addy"
 270PROCKEY
 280PROCCENTER("FERNANDO THE FLEA",2)
 290PRINTTAB(2,5)"You play the part of
fernando flea"
  300PRIN"  Who is trapped in somebody'
s hair."
  310PRIN'"  Being a flea you can fall
any distance. But don't be too long on e
ach level or your BOUNUS will reach zer
o and you will lose a life."
  320PRINT'"  To get the gems you must g
et past the monsters."
  330PRINT'"  There are four levels each
has a different monster.You must
complete all the levels to get out
of the hair."
  340FORI=1TO1000:NEXT
  350PROCKEY
  360ON ERROR CLS:GOTO370
  370PROCCENTER("FERNANDO THE FLEA",2)
  380PRINTTAB(2,5)"Use the following key
s:-"
  390PROCCENTER("Z......Left",7)
  400PROCCENTER("X......Right",9)
  410PROCCENTER("Shift.....Jump",11)
  420VDU28,10,22,30,20
  430ONERRORGOTO440
  440CHAIN"FLEA"
  450END
  460DEFPROCCENTER(A#,Y)
  470X=20-(LEN(A#)/2)
  480PRINTTAB(X,Y)A#
  490PRINTTAB(X,Y+1);STRING#(LEN(A#),"""
)
  500ENDPROC
  510DEFPROCINIT
  520VDU23,255,255,255,255,126,126,42,20
,8
  530VDU23,224,28,60,124,248,112,96,192,
224
  540VDU23,225,56,60,62,31,14,6,3,7
  550VDU23,226,42,85,16,16,28,16,24,60
  560VDU23,227,42,85,8,8,56,8,24,60
  570VDU23,228,24,60,126,255,255,126,60,
24
  580VDU23,229,0,29,17,29,5,29,0,0
  590VDU23,230,0,209,11,209,17,29,0,0
  600VDU23,231,0,220,72,200,72,72,0,0
  610VDU23,232,0,0,0,24,24,0,0,0
  620VDU23,233,0,0,36,0,0,36,0,0
  630VDU23,234,0,66,0,0,0,0,66,0
  640VDU23,235,129,0,0,0,0,0,0,129
  650VDU23,236,66,126,60,24,24,24,126,21
9
  660VDU23,237,62,126,254,62,62,62,12,28
  670VDU23,238,124,126,127,124,124,124,4
8,56
  680VDU23,239,102,153,60,24,24,36,66,23
1
  690VDU23,240,60,102,195,195,231,231,23
1,255
  700VDU23,241,24,24,24,126,126,102,126,
126
  710VDU23,242,0,255,231,195,195,231,255
,0
  720VDU23,243,255,66,255,255,126,60,24,
0
  730ENVELOPE1,1,100,127,100,1,1,1,100,-
3,-2,-1,100,0
  740ENVELOPE4,1,0,0,0,200,200,200,0,-1,
0,-80,80,0
  750ENDPROC
  760DEFPROCKEY
  770PROCCENTER("PRESS SPACE BAR",28)
  780REPEAT
  790RESTORE880
  800FORI=0TO39
  810READNOX,DU%
  820NOX=NOX-48
  830DU%=DU%+3
  840IF NOX=-48 THEN SOUND1,0,0,DU%:GOTO
880
  850IF INKEY(-99) THEN CLS:ENDPROC
  860SOUND1,4,NOX,DU%
  870SOUND1,0,0,0
  880NEXT
  890UNTILFALSE
  900DATA101,1.121,1,109,1.121,1.117,1,1
7,1,0,1
  910DATA101,1.117,1,109,1.117,1.121,1,0
,2
  920DATA101,1.121,1,109,1.121,1.117,1,1
7,1,0,1
  930DATA101,1.117,1,109,1.117,1.121,1,0
,2
  940DATA137,1.121,1,149,1.121,1.157,1,1
7,1.117,1
  950DATA157,1.117,1,149,1.117,1.137,1,1
21,1.121,1
```

Program 2.

```
   10*FX15
   20MODE1
   30PROCASS
   40PROCHALL
   50LEVZ=1:SCX=0:LIX=3
   60PROCINIT
   70VDU23;8202;0;0;0;
   80ONERRORGOTO50
   90VDU19,1,2;0;
  100PROCHALLOFFAME
  110CLS
  120COLOUR1
  130PROCINIT
  140PROCSCREEN(LEVZ)
  150PROCINIT
  160COLOUR2
  170TIME=60
  180TI%=300-INT(TIME/30)
  190IF TI%<0 THEN PROCCAUGHT
  200PROCMOVE:PROCMON:GOTO100
  210DEFFNCHAR(AX,BX)
  220?&71=AX:?&72=BX
  230CALLREC
  240CX=?&75
  250=CX
  260DEFPROCMOVE
  270PRINTTAB(XX,YZ)" "
  280PROCKEYS
  290IFFNCHAR(XZ,YZ)=130 OR FNCHAR(XZ,YZ
)=131 THEN PROCCAUGHT
  300PROCCHECK
  310IFFNCHAR(XZ,YZ+1)<>159 THEN YZ=YZ+1
:FALLX=1:GOTO330
  320FALLX=0
  330PRINTTAB(XZ,YZ)CHR$(FLEAZ)
  340PROCSCORE
  350FORIX=1TO50
  360NEXTIX
  370ENDPROC
  380DEFPROCJUMP
  390IFINKEY(-98)THENPROCLEFT:ENDPROC
  400IFINKEY(-67)THENPROCRIGHT:ENDPROC
  410SOUND1,1,210,1
  420YX=YZ-2:ENDPROC
  430DEFPROCLEFT
  440EX=0
  450FLEAX=225
  460RESTORE590
  470SOUND1,1,210,1
  480REPEAT
  490EX=EX+1
  500 IF EX MOD2=0 THEN PROCMON
  510PRINTTAB(XZ,YZ)" "
  520READAX,BZ
  530IFFNCHAR(XX+AX,YZ+BZ)=159THEN UNTIL
TRUE:ENDPROC
  540IF XX+AX<0THENAX=0:UNTILTRUE:PROCCL
:ENDPROC
  550XX=XX+AX:YZ=YZ+BZ
  560PRINTTAB(XZ,YZ)CHR$(FLEAZ)
  570FORIX=1TO50:NEXTIX
  580UNTILAX=-1 AND BZ=1:PROCCL:ENDPROC
  590DATA-1,-1,-1,-1,-1.0,-1,0,-1,1,-1,1
  600DEFPROCRIGHT
  610EX=0
  620FLEAX=224
  630RESTORE760
  640SOUND1,1,210,1
  650REPEAT
  660EX=EX+1
  670 IF EX MOD2=0 THEN PROCMON
  680PRINTTAB(XZ,YZ)" "
  690READAX,BX:IFAX=999 OR BX=999THEN750
  700IFFNCHAR(XX+AX,YZ+BZ)=159THEN UNTIL
TRUE:ENDPROC
  710IFXX+AX>39THENXX=39:PROCCL:UNTILTRU
E:ENDPROC
  720XX=XX+AX:YZ=YZ+BZ
  730PRINTTAB(XZ,YZ)CHR$(FLEAZ)
  740FORIX=1TO50:NEXTIX
  750UNTILAX=999 OR BX=999:PROCCL:ENDPRO
C
  760DATA1,-1,1,-1,1,0,1,0,1,1,1,1,999,9
99
  770DEFPROCSCREEN(LLEVZ)
  780CLS
  790COLOUR1
  800IFLEVZ=1 PRINTTAB(0,30)STRING$(40,C
HR$255):ELSE PRINTTAB(0,31)STRING$(40,CH
R$255):
  810PROCOBJECT
  820COLOUR1
  830ON LLEVZ GOTO840,850,860,870
  840RESTORE940:GOTO880
  850RESTORE950:GOTO880
  860RESTORE960:GOTO880
  870RESTORE970
  880FORIX=1TO25
  890READXX,YZ,LX
  900PRINTTAB(XX,YZ);STRING$(LX,CHR$255)
  910NEXTIX
  920COLOUR2
  930ENDPROC
  940DATA31,3,7,37,5,1,5,7,21,29,7,4,37,
7,3,29,16,1,5,9,1,26,9,1,34,18,2,5,11,7,
14,11,2,17,12,7,26,14,1,18,16,18,29,18,2
,19,20,1,28,20,3,21,21,6,19,22,1,18,23,4
,19,24,1,10,25,1,14,25,3,18,26,2,7,27,6

  950DATA0,5,23,23,7,13,15,9,7,32,9,4,30
,11,2,38,13,2,33,14,3,38,15,2,38,17,2,16
,19,5,20,19,3,38,19,2,12,21,4,36,20,1,24
,22,4,34,22,5,14,23,5,38,24,5,20,25,4,5,
27,3,12,27,12,0,28,3,6,15,3,3,23,1,35,26
,1

  960DATA5,5,5,11,6,5,20,7,4,23,9,3,25,1
1,3,27,13,3,29,15,3,37,15,3,33,16,3,29,1
8,4,28,20,4,21,22,7,16,24,2,19,24,2,28,2
4,9,22,25,5,1,26,3,11,26,6,9,28,2,13,28,
2,16,28,5,10,16,1,16,16,1,35,3,1,30,28,1

  970DATA3,4,4,12,4,4,21,4,4,30,4,4,30,4
,2,35,6,2,17,8,1,35,8,2,35,10,2,14,11,1,
3,12,3,29,12,8,23,14,4,22,16,2,17,18,7,1
4,19,2,8,28,3,31,20,3,13,22,6,17,24,2,17
,26,2,28,18,1,26,25,3,18,28,8,18,30,8

  980DEFPROCCL:PRINTTAB(XX,YZ)" ":ENDPRO
C
  990DEFPROCMON
 1000PRINTTAB(MONXX,MONYZ)" "
 1010PRINTTAB(MON2XX,MON2YZ)" "
 1020MONXX=MONXX+DIRXX
 1030MON2XX=MON2XX+DIR2XX
 1040IF MONXX>MMBX THEN DIRXX=-DIRXX:MON
CX=MONCAX
 1050IF MON2XX>MMB2X THEN DIR2XX=-DIR2XX
:MONC2X=MONCAX
 1060IF MONXX<MMAX THEN DIRXX=-DIRXX:MON
CX=MONCBX
 1070IF MON2XX<MMA2X THEN DIR2XX=-DIR2XX
:MONC2X=MONCBX
 1080IFFNCHAR(MONXX,MONYZ)=128 OR FNCHAR
(MONXX,MONYZ)=129 THENPROCCAUGHT
 1090IFFNCHAR(MON2XX,MON2YZ)=128 OR FNCH
AR(MON2XX,MON2YZ)=129 THENPROCCAUGHT
 1100PRINTTAB(MONXX,MONYZ)CHR$(MONCX)
 1110PRINTTAB(MON2XX,MON2YZ)CHR$(MONC2X)
 1120ENDPROC
 1130DEFPROCINIT
 1140IFLEVZ=1 THEN RESTORE1190
 1150IFLEVZ=2 THEN RESTORE1200
 1160IFLEVZ=3 THEN RESTORE1210
 1170IFLEVZ=4 THEN RESTORE1220
 1180READXX,YX,MONXX,MONYX,MMAX,MMBX,MON
2XX,MON2YX,MMA2X,MMB2X,O1X,O1YX,OBX,MONC
AX,MONCBX
 1190DATA1,28,11,15,11,26,31,2,32,36,31,
```

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```
1,220,227,226
 1200DATA1,29,30,23,31,33,16,18,17,21,1,
4,241,236,236
 1210DATA18,0,22,21,22,26,11,5,12,14,2,2
5,242,237,238
 1220DATA7,25,3,3,1,38,29,11,30,35,0,7,2
43,239,239
 1230DIRX%=1:DIR2X%=1:JUMPX%=0:GX%=0:FALL%
=0:FLEAX%=224:MONCZ%=MONCB%:MONCX%=MONCB%
 1240FALL%=0:FLEAX%=224
 1250ENDPROC
 1260DEFPROCGOT
 1270REPEAT:TI%=TI%-10:SC%=SC%+10:SOUND1
,4,TI%,1:PROCSCORE:UNTILTI%<=0
 1280IF SC%>SCH%(1) THEN PROCENDGAME
 1290TI%=1:PROCSCORE
 1300FORI%=1TO2500:NEXTI%
 1310PROCCAN_CAN
 1320LEVX%=LEVX%+1:IF LEVX%=5 THEN PROCENDG
AME
 1330GOTO1110
 1340ENDPROC
 1350DEFPROCASS
 1360DIMSPACE 90:PX=SPACE:OS=&FFEE
 1370FORI%=0TO25TEP2
 1380[OPTI%
 1390.REC
 1400LDAC31:JSR OS:LDA&71:JSR OS:LDA&72:
JSR OS
 1410.LDAC135:JSR&FFF4:STX&75:AND&75:LDA&
75:STA&75DIV&100
 1420.LDAC31:JSR OS:LDAEPOS:JSR OS:LDAEVP
OS:JSR OS
 1430RTS:]:NEXT
 1440ENDPROC
 1450DEFPROCCAN_CAN
 1460RESTORE1610
 1470CLS
 1480*FX15
 1490*FX15
 1500PRINTTAB(3,5)"WELL DONE! NOW ON TO
THE NEXT LEVEL";
 1510COLOUR1
 1520PRINTTAB(0,20)STRING$(40,CHR$255)
 1530COLOUR2
 1540X%=-1:Y%=19
 1550PRINTTAB(X%,Y%)" "
 1560READ NO%,DU%
 1570IFNO%=999 OR DU%=999 THEN ENDPROC
 1580IFDU%=10 THEN DU%=0
 1590DU%=DU%-3
 1600 X%=X%+1:PRINTTAB(X%,Y%)CHR$(224):S
OUND1,-10,NO%,DU%:SOUND2,-10,NO%,DU%:SOU
ND3,-10,NO%,DU%:SOUND1,0,0,0:IF X%>40 TH
EN ENDPROC ELSE GOTO1550
 1610DATA101,10,109,5,121,5,117,5,109,5,
129,10,129,10,129,5,137,5,117,5,121,5,10
9,10,109,10,109,5,121,5,117,7,109,5,101,
5,149,5,145,5,137,5,129,5,121,5,117,5,10
9,5,101,10,109,5,121,5,117,5,109,5,129,1
0,129,10
 1620DATA101,5,129,5,109,5,117,5,101,10,
999,999
 1630DEFPROCSCORE
 1640PRINTTAB(0,0)"Score ";SC%
 1650PRINTTAB(11,0)"Lives ";LI%
 1660PRINTTAB(21,0)"Level ";LEVX
 1670PRINTTAB(0,1)"Bonus ";TI%;" "
 1680ENDPROC
 1690DEFPROCCAUGHT
 1700*FX15
 1710SOUND0,4,100,50
 1720DX=0
 1730REPEAT
 1740DX=DX+1
 1750FORIX%=235 TO 232 STEP-1
 1760PRINTTAB(X%,Y%)CHR$(IX%)
 1770FORZ=1TO100:NEXTZ.IX
 1780FORIX%=232 TO 235
 1790PRINTTAB(X%,Y%)CHR$(IX%)
 1800FORZ=1TO100:NEXTZ,IX
 1810UNTILDX=2
 1820PRINTTAB(X%,Y%)CHR$240
 1830COLOUR3
 1840PRINTTAB(X%-1,Y%-1)CHR$229;CHR$230;
CHR$231
 1850FORIX%=1TO5000:NEXTI%
 1860PRINTTAB(X%-1,Y%-1)"   "
 1870PRINTTAB(X%,Y%)" "
 1880X%=1:Y%=26
 1890TIME=60
 1900COLOUR2:LIX%=LIX%-1:IF LIX%<1 THEN PRO
CDEAD ELSE IF LEVX%>4 PROCSCREEN(LEVX):E
NDPROC
 1910TIME=60
 1920ENDPROC
 1930DEFPROCOBJECT
 1940COLOUR3
 1950PRINTTAB(OIX,OIY%)CHR$(OB%)
 1960COLOUR3
 1970ENDPROC
 1980DEFPROCCHECK
 1990IF X%=OIX AND Y%=OIY% THEN SC%=SC%+
10:PROCSCORE:PROCGOT
 2000ENDPROC
 2010DEFPROCHALL
 2020RESTORE2110
 2030DIMSCH%(10),SC$(10)
 2040FORIX%=1TO10
 2050READ SCH%(IX%)
 2060NEXTI%
 2070FORIX%=1TO10
 2080READ SC$(IX%)
 2090NEXTI%
 2100ENDPROC
 2110DATA1020,1000,900,800,700,600,500,4
00,300,200
 2120DATA David,Ian,Paul,Sharon,Alison,V
ijay,Jason,Colin,Margaret,Banjan
 2130DEFPROCHALLOFFAME
 2140CLS
 2150COLOUR2
 2160PRINTTAB(13,5)"HALL OF FAME"
 2170PRINTTAB(13,6)"---- -- ----"
 2180COLOUR1
 2190FORIX=1TO10
 2200COLOUR3
 2210PRINTTAB(10,IX+9);IX
 2220COLOUR1
 2230PRINTTAB(13,IX+9);SC$(IX)
 2240PRINTTAB(25,IX+9);SCH%(IX)
 2250NEXT
 2260PROCSPACE
 2270COLOUR3
 2280ENDPROC
 2290DEFPROCFADEAD
 2300RESTORE2330:FORIX%=1TO29:READCH%,EN%
,PC%,DU%
 2310SOUNDCH%,EN%,PC%,DU%
 2320NEXT:FORI=1TO4000:NEXT
 2330 DATA&0201,-10,81,16,&0202,-10,65,3
5,&0203,-10,53,35,1,0,0,1,1,-10,81,12,1,
0,0,1,1,-10,81,4,1,0,0,1
 2340DATA&0201,-10,81,16,&0202,-10,61,35
,&0203,-10,45,35,1,0,0,1,1,-10,93,12,1,0
,0,1,1,-10,89,4,1,0,0,1
 2350DATA&0201,-10,89,0,&0202,-10,81,36,
&0203,-10,65,36,1,0,0,1,1,-10,81,8,1,0,0
,1,1,-10,81,12,1,0,0,1,1,-10,77,4,1,0,0,1
 2360DATA&0201,-10,81,32,&0202,-10,61,32
,&0203,-10,45,32
 2370CLS
 2380COLOUR3
 2390PRINTTAB(10,2)"FERNANDO THE FLEA"
 2400PRINTTAB(5,5)"YOU ARE DEAD BUT YOU
SCORED ";SC%;"."
 2410IFSC%>SCH%(10) THENPRINTTAB(1,7)"TH
IS SCORE PUTS YOU IN THE HIGH SCORE
                    TABLE.";:PROCENTER
 2420*FX15
 2430PRINTTAB(14,25)"PRESS ANY KEY"
 2440A%=GET
 2450LIX%=3:SC%=0:LEVX%=1
 2460GOTO1080
 2470ENDPROC
 2480DEFPROCENTER
 2490*FX15
 2500INPUTTAB(1,9)"ENTER YOUR NAME (MAXI
MUM OF 10 CHARS) ";NAM$
 2510IF LEN(NAM$)>10 THEN PRINTTAB(5,9)S
PC(100):GOTO2500
 2520FORIX%=1TO10
 2530IFSC%>SCH%(IX%) THEN PX=IX%:IX%=10
 2540NEXTI%
 2550FORRX%=10 TO PX+1 STEP-1
 2560SCH%(RX%)=SCH%(RX%-1):SC$(RX%)=SC$(RX%-
1)
 2570NEXT
 2580SCH%(PX%)=SC%:SC$(PX%)=NAM$
 2590NAM$=""
 2600ENDPROC
 2610DEFPROCKEYS
 2620IF INKEY(-98) AND JUMPX%=0 AND FALL%
=0 AND X%>0 THEN X%=X%-1:FLEAX%=225
 2630IF INKEY(-67) AND JUMPX%=0 AND FALL%
=0 AND X%<39 THEN X%=X%+1:FLEAX%=224
 2640IF INKEY(-1) AND JUMPX%=0 AND FALL%=
0 THEN PROCJUMP
 2650ENDPROC
 2660DEFPROCSPACE
 2670PRINTTAB(14,25)"PRESS SPACE"
 2680IF INKEY(-99) THEN ENDPROC
 2690GOTO2600
 2700ENDPROC
 2710DEFPROCENDGAME
 2720CLS
 2730VDU19,0,4;0;
 2740PRINTTAB(2,5)"Well done you have co
mpleated all the   levels.";:IF SC%>SCH%
(10) THEN PRINT;"Which means you are in
the top   ten.";:PROCENTER
 2750*FX15
 2760PRINTTAB(10,24)"PRESS SPACE"
 2770REPEAT
 2780K$=GET
 2790UNTIL K$=32
 2800SC%=0:VDU19,0,0;0;
 2810GOTO50
```

Gardener

R Williams, Deganwy, Gwynedd.

Vic 20

IN GARDENER you are the man at the bottom of the screen with a bucket on your head. To your left is a dripping tap and to your right a ladder which leads to four levels, each with a sunflower on it.

Program 1.

```
READY.
10 POKE36879,25:PRINTCHR$(14);CHR$(8)
20 PRINT"[RVS][RVS][RVS][RVS]ETTING UP CHARS.","[RVS][RVS][RVS][RVS]FND \,-","/,"[RVS][RVS][RVS][RVS]LEASE WAIT...."
40 POKE56,27:FORI=6913TO7614 READJ:POKEI,J:NEXT:LOAD"",1,1
40 DATA32,110,29,160,0,132,253,132,10,165,0,133,254,165,1,133,255,165,197,201,12
,240,16
50 DATA201,36,240,52,201,20,240,100,201,21,208,3,76,176,27,96,32,58,29,162,44,32
,8,29
60 DATA169,22,209,254,240,3,76,253,27,145,0,169,3,145,2,169,18,145,254,162,6,32,
34,29
70 DATA162,22,32,23,29,76,98,29,32,58,29,162,22,32,23,29
80 DATA138,209,254,240,3,76,253,27,162,44,32,8,29,169,22,145,254,162,3,32,34,29,
162,22
90 DATA32,23,29,169,18,145,254,162,6,32,34,29,162,22,32,23,29,76,98,29
100 DATA32,66,29,162,21,32,23,29,169,32,209,254,240,107,145,0,162,43
110 DATA32,8,29,169,32,145,254,138,254,169,18,145,254,162,6,32,34,29,162,22,32,2
3,29,76
120 DATA98,29,32,82,29,162,23,32,23,29,177,254,201,32,240,63
130 DATA202,32,8,29,177,254,201,24,208,4,230,10,16,49,169,32,145,0,232,32,8,29,1
69,32
140 DATA145,254,230,254,169,18,145,254,162,6,32,34,29,162,22,32,23,29,76,98,29
150 DATA169,3,145,2,165,254,133,0,133,2,165,255,133,1,73,136,133,3,165,0,133,254
,165,1
160 DATA133,255,165,6,240,69,165,10,240,65,162,22,32,8,29,169,17,145,254,198,10,
198
170 DATA6,169,66,141,148,28,141,149,28,169,170,141,11,144
180 DATA160,1,162,255,142,11,144,32,150,239,32,150,239,202,208,244,136
190 DATA208,239,169,18,145,254,200,169,25,145,254,162,22,32,8,29,169,29,145,254,
230
```

The object of the game is to stop the flowers wilting, and therefore dying, by catching the water and pouring it on the flowers which will suddenly perk up. For each bucket of water poured on a flower you score five points. You start with three lives and there is a bonus life at 80 points. The keys to control the man are:

UP — I
DOWN — M
LEFT — J
RIGHT/POUR — L

Written in 2 parts

The program is written in two parts so as to fit in 3.5K. The first part lowers the ramtop to decimal 6912 and loads in the machine code to move the man, and the user-defined graphic characters. Great care should be taken here as no error traps could be included due to memory limitations — so type with care!! The first part when saved, automatically loads the second part, when run. Below is a description of the second part of the program.

Lines 10-20: Waits for a keypress on first run then sets up the variables.

```
200 DATA253,165,251,10,10,9,128,141,12,144,96
205 REM*** CHAR.DATA ***
210 DATA0,0,0,255,255,0,0,0,0,56,16,252,252,12,12,0
220 DATA90,90,60,24,24,84,34,2,90,90,60,24,24,40,68,72,90,90,60,24,24,20,34,18
230 DATA90,90,60,24,24,42,68,64,0,0,16,32,64,32,95,78,0,0,0,66,66,66,126,0
240 DATA0,2,134,0,71,119,0,0,90,90,60,24,24,36,36,36,16,16,56,124,124,124,56,16
250 DATA66,66,126,66,66,66,126,66,0,238,238,0,119,119,0,0,255,255,126,126,126,12
6,60,60
260 DATA8,8,8,137,74,42,44,28,8,8,4,4,4,8,107,156,0,0,32,80,200,200,8,28
270 DATA0,0,0,0,0,24,44,0,0,0,28,34,42,34,28,0,0,0,0,24,44,36,24,0,0,0,0,0,0,0,0
,0
280 DATA0,0,0,0,0,0,0,0
290 DATA128,133,252,56,165,254,229,252,133,254,176,2,190,255,96
300 DATA24,138,101,254,133,254,144,2,230,255,96
310 DATA165,255,73,136,133,255,138,145,254,165,255,73,136,133,255,96
320 DATA165,251,201,15,240,5,169,15,133,251,96,169,14,133,251,96
330 DATA165,251,201,16,240,5,169,16,133,251,96,169,15,133,251,96
340 DATA165,251,201,13,240,5,169,13,133,251,96,169,14,133,251,96
350 DATA165,251,145,254,162,0,32,34,29,76,235,27
360 DATA173,4,31,201,32,208,13,169,22,141,4,31,141,238,30,169,3,141,238,150
370 DATA173,114,31,201,32,208,13,169,22,141,114,31,141,92,31,169,3,141,92,151
380 DATA173,150,30,201,32,208,13,169,22,141,150,30,141,128,30,169,3,141,128,150,
173,202
390 DATA31,201,32,208,13,169,22,141,202,31,141,224,31,169,3,141,202,151,96

READY.
```

Program 2.

```
READY.
10 H=8:P(0)=7810:P(1)=7920:P(2)=8030:P(3)=8140:PRINT"[CLR][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN]HIT A KEY":WAIT1
97,15
20 C=30720:N=36876:T=1000:S=0:L=3:G=1:D=8035:POKEN-7,255:POKEN+2,15:POKEN+3,25
30 PRINT"[CLR][RVS][RED][RED][RED][RED][RED][RED][RED][RED][RED][RED][RED][RED][RED][RED][RED][RED][RED][RED]XXL" POKE0,216:POKE2,216:POKE1,31:POKE3,151
40 FORI=8164TO8185:POKEI,23:POKEI+C,2:NEXT
50 FORI=0TO2:POKE7853+I,23:POKE7853+I+C,2:POKE7963+I,23:POKE7963+I+C,2
60 POKE8073+I,23:POKE8073+I+C,2:NEXT
70 FORI=7880TO8160STEP22:POKEI,22:POKEI+C,3:NEXT:POKE8152,20:POKE8152+C,0:POKE81
30,18
80 FORI=0TO3:POKEP(I),25:POKEP(I)+C,5:POKEP(I)+22,24:POKEP(I)+22+C,0:POKEP(I)-22
,29
90 POKEP(I)+C-22,7:NEXT:POKE8167,19:POKE8138+C,6
100 J=INT(RND(2)*4):IFPEEK(P(J))=28ANDRND(2)<.06THEN190
110 IFRND(1)<.07ANDPEEK(P(J))<>28THENPOKEP(J),PEEK(P(J))+1:POKEP(J)-22,PEEK(P(J)
-22)+1
120 PRINT"[HOME][DOWN]";S;"/HI:"H;"[RVS]LEFT$("TTTT",L):SYS6913:FORI=1TO78-S/4:NEXT
130 IFPEEK(253)<>0THENS=S+5:POKE253,0:IFH<STHENH=S
140 IFS=80THENL=L+G:G=0
150 IFPEEK(D)>18THENPOKED,32:D=D+22:IFD=8167THEN8035:POKEN,200
160 IFPEEK(D)<19THENPOKE6,1:POKE7316,126:POKE7317,126:D=8035:GOTO180
170 POKED,21:POKED+C,6
180 POKEN,0:GOTO100
190 FORI=1TO1000:NEXT:FORI=248TO128STEP-10:POKEN-1,I:FORJ=1TO70:NEXTJ,I
200 FORI=1TOT:NEXT:POKEN-1,0:L=L-1:IFLTHENFORI=1TO2*T:NEXT:GOTO30
210 PRINT"[HOME][DOWN][DOWN][DOWN][DOWN][DOWN]ANOTHER GO(Y/N)?";I=PEEK(197):IFI=28THENPOKE198,0:SYS212
220 IFI<31THEN210
230 FORI=1TO4*T:NEXT:POKE7316,66:POKE7317,66:POKE6,0:GOTO20

READY.
```

Lines 30-90: Sets up the screen — ladder, floors, flowers. Also the man's starting position.

Lines 100-110: Picks the number of the flower to be wilted — if any. If a flower has wilted too far then exit to line 200.

Line 120: Prints "score", "high", "lives"; calls the machine code to move the man; delays depending on the score.

Line 130: If Peek (253) had been set during the machine code then five points are added to the score and the high score checked for.

Line 140: If the score is 80, then a bonus life is given.

Lines 150-180: Moves the drop down the screen and "fills" the man's bucket if he catches it.

Lines 190-200: Makes a noise, takes a life away. If there are enough lives left then program goes to line 30.

Lines 210-230: Asks if user wants another go. If Yes then program moves to line 20. If No then SYS212, which resets the machine as if a RUN/STOP-RESTORE had been performed.

After typing in the second part it should be saved by typing

SAVE"",1,1

The first program will automatically run the second after it has loaded it.

Jon the Jany

N Billiland,
Grangemouth,
Stirlingshire.

Spectrum

JON the Jany is a ladders and platform game. You play the part of Jon whose sole purpose in life is to switch off light bulbs. To do this you must walk under them. Once you have switched off all the lights you get a different screen to complete and two extra lights to switch off. Sounds easy but as usual there are monsters that kill if they are touched.

Jon the Jany is written in Basic and machine code. The machine code controls the monsters and the rest is in Basic. The screens, bulbs and monsters are all printed up randomly and the cursors control Jon.

```
 10 CLEAR 33499: BORDER 0: PAPE
R 0: OVER 0: INK 6: INK 6: CLS
 LET HI=0: GO SUB 5000: GO TO 45
00
 30 GO SUB 1500
 35 GO SUB 1000: GO SUB 2000: G
O SUB 3500
1000 REM MAIN ROUTINE
 1110 IF INKEY$<>"" THEN BEEP .00
1,20
 115 LET X1=X: LET Y1=Y: IF ATTR
(Y+2,X+1)=28 THEN GO TO 130
 120 IF ATTR (Y+2,X)=7 THEN GO T
O 600
 130 LET X=X+(INKEY$="8" AND X<3
1)-(INKEY$="5" AND X>0):
 200 LET Y=Y+(INKEY$="9" AND ATT
R (Y+2,X)=7)-(INKEY$="7" AND ATT
R (Y,X)=7)
 205 OVER 1: PRINT AT Y1,X1,A$(A
,1);AT Y1+1,X1,A$(A,2): IF A=3 T
HEN LET A=2: GO TO 300
 220 IF A=1 THEN LET A=4: GO TO
300
 230 IF INKEY$="8" THEN LET A=3
 240 IF INKEY$="5" THEN LET A=1
 300 PRINT AT Y,X;A$(A,1);AT Y+1
,X;A$(A,2): OVER 0: IF ATTR (Y-1
,X)=71 THEN PRINT AT Y-1,X; INK
4;"[UDG]": BEEP .01: LET T=T+1: LE
T S=S+10: PRINT AT 0,5; S: IF T=N
THEN GO TO 3000
 320 IF ATTR (Y+1,X)=4 OR ATTR (
Y+1,X+1)=4 OR ATTR (Y+1,X-1)=4 O
R ATTR (Y,X)=4 THEN GO SUB 4000
 400 RANDOMIZE USR 33500: GO TO
110
1000 REM SCREEN
 1010 PRINT AT 0,0; INK 7;"SCORE
:";S;AT 0,12;"HI SCORE:";HI;AT 0,
27;"MEN ";L;AT 21,0;"SCREEN ";S
 1020 FOR F=4 TO 20 STEP 4: PRINT
AT F,0; INK 2;"AAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAA": IF F=20 THEN G
O TO 1110
 1050 FOR G=1 TO 3
 1060 LET C=INT (RND*30)+1: IF AT
TR (F,C)=7 OR ATTR (F,C-1)=7 T
HEN GO TO 1060
 1090 FOR H=-1 TO 3: PRINT AT F+H
,C; INK 7;"B": NEXT H: NEXT G: N
EXT F
 1110 IF ATTR (15,0)=7 AND ATTR
(15,2)=7 THEN FOR F=15 TO 19: P
RINT AT F,1; INK 7;"B": NEXT F
RETURN
 1500 REM VARIABLES
 1510 DIM A$(3,2): LET A$(1,1)="H
": LET A$(1,2)="I": LET A$(2,1)=
"E": LET A$(2,2)="F": LET A$(3,1
)="C": LET A$(3,2)="D"
 1550 LET N=8: LET S=0: LET T=0
 LET SCR=1: LET U=4: LET B$="PRE
SS ANY KEY TO START.....":
 1650 LET X=0: LET Y=18: LET A=2:
 PRINT AT Y,X;A$(A,1);AT Y+1,X;A
$(A,2): RETURN
 2000 REM LIGHT BULBS
 2010 FOR F=1 TO N
 2020 LET Y1=(INT (RND*4)+1)*4+1:
 LET X1=INT (RND*32)+1: IF ATTR (Y
,X1)=28 THEN GO TO 2020
 2050 PRINT AT Y1,X1; INK 7; BRIG
HT 1;"[UDG]": NEXT F: RETURN
 2500 REM SCORE AND LIVES
 2510 POKE 23659,0: LET B$=B$(2,T
O 1+B$(1)): PRINT AT 22,0; INK 7;
 BRIGHT 1;B$: TO 32): BEEP .001
: INT (RND*50)+10: IF INKEY$="" T
HEN GO TO 2500
 2515 PRINT AT 22,0;"                  ": POKE 2365
9,2
 2520 RETURN
 3000 REM COMPLETED LEVEL
 3010 FOR F=1 TO 10: BEEP .01,40+
F: NEXT F: FOR F=10 TO -20 STEP
-.7: BEEP .01,40+F: NEXT F: PRIN
T AT 21,0: POKE 23692,20: FOR F=
0 TO 21: PRINT: BEEP .005,10+(F
+2): NEXT F
 3026 INK 7: PRINT AT 8,6;"YOU AC
TUALLY CLEARED";AT 10,10; BRIGHT
 1;"S C R E E N";AT 4,14; FLASH
 1;"YOU";AT 6,12; INVERSE 1;"AMAZ
ING"
 3032 PRINT AT 14,13; FLASH 1;SCR
;AT 14,17;SCR;AT 16,15;SCR;AT 12
,15;SCR;AT 14,15; INVERSE 1;SCR
 3040 GO SUB 2500: PAPER 7: CLS
 PAPER 0: INK 6: INK 6: CLS : LE
T SCR=SCR+1: LET N=N+2: LET T=0:
 GO SUB 1650: GO TO 30
 3500 REM PLAY FOR MORE
 3530 LET P=33828: FOR F=1 TO 5:
POKE P,(INT (RND*30)+1)+(INT (RN
D*2)+128*96): POKE P+1,64+INT (R
ND*2)*8: POKE P+2,INT (RND*2)+1
 POKE P+3,4: LET P=P+4: NEXT F:
3540 POKE P,255: POKE P+1,255: P
OKE 33827,1: RANDOMIZE USR 33500
: POKE 33827,0: RETURN
 4000 REM MAN DIED
 4010 OVER 1: BRIGHT 8: PRINT AT
Y,X;A$(A,1);AT Y+1,X;A$(A,2): FO
R F=Y+2 TO 22 STEP 1: PRINT AT F
,X;"E";AT F+1,X;"F": BEEP .005,F
: PRINT AT F,X;"E";AT F+1,X;"F":
 NEXT F
 4110 OVER 0: GO SUB 1650: LET U
=U-1: IF U>0 THEN PRINT AT 0,
31;U: GO SUB 2500: RETURN
 4120 BEEP 1,-20: IF S>HI THEN PR
INT AT 10,10; FLASH 1; INK 7;"NE
W HI SCORE": FOR F=-20 TO 20: BE
EP .01,F: NEXT F: PRINT AT 12,11
 INK 7;"WELL DONE": PAUSE 0: P
AUSE 100: LET HI=S
 4130 FOR F=50 TO 0 STEP -2: BEEP
 .01,F: NEXT F: CLS : PRINT AT 6
```

(continued on next page)

- Do not break into the program when scrolling message appears at the bottom of the screen because

POKE 23659,0

is used to print the message on the 22nd line and the program will crash if attempting to do so. If you can't be be bothered to type in this great program send a sae and £1.50 to N. Billiland, 22 Garry Place, Grangemouth, Stirlingshire.

(continued from previous page)

```
,4; INK 7;"YOUR FINAL SCORE WAS
";S; PRINT AT 9,5; FLASH 1; INK
7;"DO YOU WANT ANOTHER GAME ?"
GO SUB 2500
4140 IF INKEY$="y" OR INKEY$="*"
THEN CLS : GO TO 30
4150 IF INKEY$="n" OR INKEY$="N"
THEN GO TO 4500
4160 GO TO 4130
4500 REM *ENDING SCREEN
4510 LET B$="
                    YOU THE JANY  BY NG
                    GUIDE  WON  ARND TH
E FACTORY (using the cursors) SU
ITCHING OFF ALL THE LIGHTS
                    BUT WATCH OUT FOR THE
FUNNY BLOBS
ARE FATAL IF TOUCHED (press any
key to play)"
4520 CLS : PRINT AT 6,6; INK 5;
BRIGHT 1;"U N N  T H E  J A N Y
,AT 10,5; INK 7;"Written by N.G.
"
4530 GO SUB 2500: FOR F=0 TO 30
: BEEP .01,F: NEXT F: PAPER 7: CL
S : PAPER 0: CLS : GO TO 30
5000 REM *FAIL
5005 PRINT AT 10,6; INK 7;"PLEAS
E WAIT A MINUTE"
5010 RESTORE 5080: FOR F=USR "A"
TO USR "U"+7: READ A: POKE F,A:
NEXT F
5020 RESTORE 9000: FOR F=33500 T
O 33629: READ A: POKE F,A: NEXT
F: RETURN
5080 DATA 255,24,24,255,255,129,
129,255
5090 DATA 129,129,129,255,255,12
9,129,129
5100 DATA 28,28,28,9,29,45,75,72
,20,20,148,84,52,34,73
5110 DATA 28,28,28,8,28,42,42,42
,42,20,20,20,20,20,20,54
5120 DATA 60,126,90,90,126,102,1
02,60
5130 DATA 56,56,56,144,184,180,2
10,18,18,40,41,42,74,68,64,192
5140 DATA 24,24,60,60,60,24,0,0
5160 GO TO 4130
9000 DATA 17,36,132,26,254,255,4
,0,5,205,241,130,24,246,19,26,254
,255,200,27,24
9010 DATA 243,26,111,19,26,103,1
9,205,111,131,26,108,131,19,225
,205,126,131,26,254
9020 DATA 4,32,2,62,7,119,225,58
,58,32,167,40,2,19,201,213,27,2
05,45,131
9030 DATA 27,124,18,27,125,18,20
9,229,205,126,131,126,18,54,4,22
,205,108,131,19
9040 DATA 201,26,203,71,32,13,20
3,79,32,11,203,87,32,9,203,95,32
,26,201,13
9050 DATA 201,35,201,213,125,230
,224,40,8,167,17,32,0,237,82,209
,201,17,32,7
9060 DATA 237,82,209,201,213,125
,230,224,254,224,40,6,17,32,0,25
,209,201,17,7
9070 DATA 7,25,209,201,229,213,1
7,156,255,6,8,78,26,169,119,56,1
9,16,246,209
9080 DATA 225,201,124,203,163,20
3,63,203,63,203,63,103,213,17,0,
88,25,209,201,125
9090 DATA 230,32,254,31,32,6,62,
0,203,199,18,201,167,32,6,62,0,2
03,207,18
9100 DATA 201,229,205,67,131,205
,126,131,126,254,6,225,32,17,229
,205,88,131,205,126
9110 DATA 131,126,254,2,225,40,4
,205,223,131,201,229,205,67,131,
205,126,131,126,254
9120 DATA 5,225,200,229,205,88,1
31,205,126,131,126,254,2,225,192
,205,240,131,201,205
9130 DATA 17,132,230,3,40,249,25
4,1,32,23,62,0,203,223,18,201,20
5,17,132,230
9140 DATA 3,40,249,254,1,32,6,62
,0,203,215,18,201,254,2,32,6,62,
0,203
9150 DATA 199,18,201,62,0,203,20
7,18,201,229,42,33,132,25,126,71
,230,63,103,34
9160 DATA 33,132,120,225,201,0,0
,0,255,255
```

Outlaw

Chris Colley,
Cambridge,
Cambridgeshire.

ZX-81

THE IDEA is to get your prisoner from hideout at the bottom of the screen to the castle at the top, steal some gold and return with it to your hideout. In between, you have to negotiate the changing doorways in the outer walls and avoid the patrolling guard. You have to make the trip 12 times in all and each time the game gets slightly faster.

You may wait in a doorway for a passage to clear and in this time you may find the gap changes and a wall is built on top of you. You may use this to your advantage since, when you move, there will be two gaps in that wall until the next change. Be careful not to forget your position while you're hidden though.

To enter the program you will need a Rem of 1304 bytes.

Enter the code, delete the hexloader, enter the Basic from program 1 and run. And there it is. The machine code may be stopped at any time by pressing shift with P, 0, Newline or Space. If the game is too fast, the speed may be changed by Poking 17480. This is initially set at 16 and the delay is caused by the computer counting up to

(PEEK 17480 – SCORE) x 256

Therefore, a number lower than 16 makes the game virtually unplayable in the later stage, while a number higher than about 30 makes it tediously slow in the early stages. If you require a challenge, cut your number of lives by Poking 17435 with the number of lives you require.

The hex loader.

```
  1 REM HEXLOADER FOR OUTLAW
 10 PRINT "START ADDRESS"
 20 INPUT S
 30 PRINT "FINISH ADDRESS"
 40 INPUT F
 50 FOR N=S TO F STEP 8
 60 LET T=0
 70 PRINT N;" - ";
 80 INPUT A$
 90 PRINT A$;" = ";
100 INPUT TOT
110 PRINT TOT
120 LET Z=0
130 FOR K=1 TO LEN A$ STEP 2
140 LET C=(CODE A$(K)-28)*16+CO
DE A$(K+1)-28
150 LET T=T+C
160 POKE N+Z,C
170 LET Z=Z+1
180 NEXT K
190 IF TOT=T THEN GOTO 220
200 PRINT "ERROR - PLEASE INPUT
AGAIN"
210 GOTO 60
220 NEXT N
```

The Basic program.

```
  1 LET HI=0
  5 FAST
 10 CLS
 20 POKE 16418,0
 30 PRINT "
 40 PRINT "
 50 PRINT "
 60 PRINT "
 70 PRINT "
 80 LET Z=PEEK 16396+256*PEEK 1
6397
 90 POKE Z+1,200
100 POKE Z+67,200
110 POKE Z+133,200
120 PRINT "
130 PRINT "
140 PRINT "
150 FOR A=9 TO 20
160 PRINT AT A,0;"";AT A,29;
"
170 NEXT A
180 PRINT "                    PRESS B KE
Y
190 PRINT "
200 PRINT "
210 GOSUB 250
220 PRINT AT 10,11;" INPO";A
T 13,11;"P  KEY";AT 16,11;"S
PLAY";AT 19,11;"4  QUIT"
225 SLOW
230 GOTO 230+70*(INKEY$="1")+17
0*(INKEY$="2")+270*(INKEY$="3")+
60*(INKEY$="4")
240 GOTO 230
250 FOR A=9 TO 20
260 PRINT AT A,3;"
                    "
270 NEXT A
280 RETURN
290 STOP
300 GOSUB 250
310 PRINT AT 10,4;"YOUR TASK IS
TO ROB THE";TAB 11;"TRE 4;"S
HERIFF'S GOLD AND TAKE";TAB 5;"TA
B 4;"IT TO YOUR HIDEOUT IN";TAB
5;"TAB 4;"THE WOODS,THE PACE HOTS
";TAB 5;"TAB 4;"UP EACH TIME YOU
SUCCEED."
320 IF INKEY$="" THEN GOTO 320
330 GOSUB 250
340 PRINT AT 10,4;"THE PASSAGES
ARE GUARDED";TAB 5;"TAB 4;"SO ST
AY ON YOUR TOES,YOU";TAB 5;"TAB 4
;"HAVE 10 LIVES AND MUST";TAB 5;
TAB 4;"MAKE 12 TRIPS IN ALL.";TA
B 5;TAB 4;"GOOD LUCK"
350 IF INKEY$="" THEN GOTO 350
360 GOTO 110
400 GOSUB 250
410 PRINT AT 10,15;"UP";TAB 11;
"123456789 0";TAB 9;TAB 8;"  OVER
T  YUIOP";TAB 9;TAB 8;"  ASDFG
HJKL";AT 17,11;"ZXCVBNM.?";
TAB 14;"DOWN"
420 IF INKEY$="" THEN GOTO 420
430 GOTO 210
500 RAND
510 LET L=USR 17394
520 LET S=PEEK 16447
530 PRINT AT 20,10;"PRESS A KEY
";AT 23,10;"PRESS B KEY"
540 IF INKEY$="B" THEN GOTO 530
550 POKE 16418,2
560 CLS
570 PRINT TAB 11;"GAME OVER";TA
B 11;"---------"
580 PRINT "SCORE=";S
590 IF HI<S THEN GOTO 620
600 PRINT "A NEW HI-SCORE."
;"PLEASE INPUT YOUR NAME."
610 INPUT H$
615 LET HI=S
620 PRINT ,,,,"HI-SCORE=";HI;"
BY ";H$
630 PRINT AT 21,10;"PRESS B KEY
"
640 IF INKEY$="" THEN GOTO 640
650 GOTO 5
700 SAVE "OUT
710 RUN
```

The hex dump.

```
16514 - 07070707070703003 = 48
16522 - 03030303030303003 = 24
16530 - 03030303030303003 = 24
16538 - 03038484848484848 = 796
16546 - 76058580000000000 = 640
16554 - 00000000002181 = 260
16562 - 81828282010000000 = 520
16570 - 00000000000000005 = 389
16578 - 00000000000000000 = 773
16586 - 00000000000000080 = 128
16594 - 80808000000000000 = 640
16602 - 00000000000000003 = 384
16610 - 05857605858080080 = 776
16618 - 80808000000000000 = 1024
16626 - 00000000000000000 = 1076
16634 - 80808000000000000 = 1024
16642 - 80058576058580080 = 775
16650 - 80808000000000000 = 1024
16658 - 80808000000000000 = 1076
16666 - 80808000000000000 = 1024
16674 - 80808585760585080 = 779
16682 - 80808000000000000 = 1024
16690 - 80808585760585080 = 1076
16698 - 80808000000000000 = 1024
16706 - 80808585760585080 = 645
16714 - 00000000000000000 = 0
16722 - 00000000000000000 = 0
16730 - 00000000000000000 = 0
16738 - 00000000000857605 = 256
16746 - 8A8A8A8A8A8A8A8A = 1104
16754 - 8A8A8A8A8A8A00A8A = 966
16762 - 8A8A8A8A8A8A8A8A = 1104
16770 - 8A8A8A8A8A8A8576 = 1079
16778 - 05000000000000000 = 0
16786 - 00000000000000000 = 0
16794 - 00000000000000000 = 0
16802 - 00000000000000085 = 133
16810 - 76585858A8A8A8A8A = 951
16818 - 8A8A8A8A8A8A8A8A = 1104
16826 - 8A8A8A8A03A8A8A8A = 966
16834 - 8A8A8A8A8A8A8A8A = 1104
16842 - 85760500000000000 = 256
16850 - 00000000000000000 = 0
16858 - 00000000000000000 = 0
16866 - 00000000000000000 = 0
16874 - 00000857605A8A8A8A = 303
16882 - 8A8A8A8A8A8A00A8A = 966
16890 - 8A8A8A8A8A8A8A8A = 1104
16898 - 8A8A8A8A8A8A8A8A = 1104
16906 - 8A8A857605000000 = 532
16914 - 00000000000000000 = 0
16922 - 00000000000000000 = 0
16930 - 00000000000000000 = 0
16938 - 00000857605A8A8A = 532
16946 - 8A8A8A8A8A8A8A8A = 1104
16954 - 8A8A8A8A8A8A8A8A = 1104
16962 - 8A8A03A8A8A8A8A8A = 966
16970 - 8A8A8A8A857605000 = 808
16978 - 00000000000000000 = 0
16986 - 00000000000000000 = 0
16994 - 00000000000000000 = 0
17002 - 00000000857605000 = 256
17010 - 8A8A8A8A8A8A00A8A = 966
```

The hex dump.

```
17018 - 8A8A8A8A8A8A8A8A = 1104
17026 - 8A8A8A8A8A8A8A8A = 1104
17034 - 8A8A8A8A8A8A8576 = 1079
17042 - 0500000000000000 = 5
17050 - 0000000000000000 = 0
17058 - 0000000000000000 = 0
17066 - 0000000000000085 = 133
17074 - 7605000001820000 = 382
17082 - 0000018200000000 = 259
17090 - 0000000000008182 = 259
17098 - 0000000001820000 = 259
17106 - 8576050001808082 = 771
17114 - 0000015080820087 = 650
17122 - 8383830904005180 = 663
17130 - 8082000081808082 = 773
17138 - 0085760585808080 = 773
17146 - 8005858080808085 = 783
17154 - 8500000000058580 = 399
17162 - 8085858585808080 = 906
17170 - 8005857605008480 = 649
17178 - 8007000084808007 = 530
17186 - 0085000000000500 = 136
17194 - 8480800700008480 = 655
17202 - 8007008576050000 = 391
17210 - 0085000000008505 = 276
17218 - 0000050000000005 = 135
17226 - 0000050000000000 = 135
17234 - 8505000005760500 = 394
17242 - 0085050000000085 = 271
17250 - 0500000013030303 = 19
17258 - 0100000505000000 = 139
17266 - 0085050000857682 = 519
17274 - 8383818283838383 = 1045
17282 - 8183838383838383 = 1045
17290 - 8383838381828383 = 1045
17298 - 8383818283838175 = 1030
17306 - FFE9002E01D01AFF = 517
17314 - 01F1010A014C018E = 473
17322 - 01D0012C32405BD = 543
17330 - 2929192929291922 = 289
17338 - 3240700C0DRAD43E5 = 1114
17346 - 0EFE09F0C29B6F26 = 1019
17354 - 435E23562A0C4019 = 425
17362 - E5061E368A2310FB = 789
17370 - CDAD43E61FFE1DF2 = 1231
17378 - DA435F3E0057E119 = 779
17386 - 77C90B78B120FBC9 = 1112
17394 - 1682402E0C4023DA = 368
17402 - FEFF2804770319F6 = 945
17410 - 3E003E3C40323D40 = 411
17418 - 32E4D323F402A0C = 407
17426 - 4011770219224040 = 389
17434 - 3E093E2424D2A0C40 = 368
17442 - 1143021922440C6 = 330
17450 - B42A4040A2A24006 = 736
17458 - 3277C3B6143C3D40 = 781
17466 - 3CFE10CCBE43323D = 902
17474 - 403A3F4047 3E1090 = 542
17482 - 470E00CCEC43CCBB = 985
17490 - 027CFEFCC87DAF6F = 1115
17498 - E681280511210018 = 478
17506 - 7E0E1E1828E11DF = 592
17514 - FF15127DE6602805 = 793
17522 - 1101001F0B7DE606 = 411
17530 - 2E211FFFF2FA4340 = 773
17538 - 197EFE00280AFE8D = 850
17546 - 286CFE09287A180B = 608
17554 - 2A4340360019368A = 486
17562 - 2243403A3C40CB47 = 621
17570 - C2374424A4403600 = 546
17578 - 237EFE002003688E = 648
17586 - 2245400C3744FEB4 = 919
17594 - 2813CDAD43E606C6 = 938
17602 - A56F26435E23562A = 638
17610 - 0C4019180C368B01 = 539
17618 - 0030CDEC4336003A = 668
17626 - 424003DFEFFC83242 = 1016
17634 - 403A3E40CB47CA1F = 755
17642 - 442A4740368C8E00 = 502
17650 - 323E40C31F443A3E = 590
17658 - 40CB47C29D443C32 = 867
17666 - 3E4022474C039244 = 704
17674 - 3A3E40CB47CA9D44 = 885
17682 - 2A4340360019191E5 = 506
17690 - 1EFEE002000EE119 = 701
17698 - 36B4100040CDEC43 = 747
17706 - 360018EB11FFFFE1 = 1065
17714 - E5197EFE002001E1 = 905
17722 - 1368B4AD0CDEC = 705
17730 - 43360018EBE1E536 = 888
17738 - 8D3A3F4033323F40 = 563
17746 - FE0C2003E100C911 = 744
17754 - 0100E1E5197EFE00 = 860
17762 - 200EE11936B40100 = 531
17770 - 04CDEC43360018EB = 825
17778 - 0DFFFE1E5197EFE = 1338
17786 - 00200EE11936B401 = 531
17794 - 0004CDEC43360018 = 590
17802 - EBE1DA54003E = 751
17810 - 00323E40C31F44 = 470
```

Easy key

Vic 20

Andrew Breen,
Paisley.

THIS PROGRAM allows all the keys on the Vic-20's keyboard to be defined except the Shift, CBM logo key and the Restore keys. It gives a sort of one touch entry system as on such machines as the Electron and Spectrum.

Each key can be programmed with up to eight characters, which can be ordinary characters or can be control characters. The figure shows what the keys are currently programmed with: to change them, you will have to program them in order depending on what key by using the values on page 179 on the Programmer's Reference guide, or the table below.

The program takes up 768 bytes of memory and is totally relocatable, so it can be used on any Vic-20. You are asked to enter the Page number of the program. The program has been designed to fit from the start of one page right to the end of the third page. To work out the page number and divide it by 256 and take the whole number part to the result. Make sure that the area of memory is protected from the Basic program and variables by lowering the memory.

Value	Key	Value	Key	Value	Key	Value	Key
0	1	16	none	32	Space	48	Q
1	3	17	A	33	Z	49	E
2	5	18	D	34	C	50	T
3	7	19	G	35	B	51	U
4	9	20	J	36	M	52	O
5	+	21	L	37		53	@
6	£	22	;	38	none	54	
7	DEL	23	←	39	f1	55	f5
8	←	24	STOP				
99	W	25	none	56	2		
10	R	26	X	42	F	57	4
11	Y	27	V	43	H	58	8
12	I	28	N	44	K	60	0
13	P	29	,	45	:	61	—
14	x	30	/	46	=	62	HOME
15	RETURN	31		47	f3	63	f7

No key gives 64.

Start address is the page number multiplied by 256 plus 75. Therefore use:

. Use SYS (page number)x256 + 75

In the data statements, use the left arrow character ('←') to represent return for direct commands, e.g List and Run.

```
READY.
0 REM ***************
1 REM *  CTRL  KEY  *
2 REM *   KEYWORD   *
3 REM *     AND     *
4 REM *  KEY BOARD  *
5 REM *  EXPANSION  *
6 REM *   ROUTINE   *
7 REM *     V.2     *
8 REM *  (C)  1985  *
9 REM *  A.R.BREEN  * 10REM ****
***********
10 PRINT"■";
20 INPUT"OHAT ?AGE";P:D=P*256
30 FORT=8T085:READM$:GOSUB100:PO
KED+T,M:NEXTT
40 POKED+31,P+1:POKED+58,P+2:POK
ED+81,P
50 FORF=8T063:READS$:R$=CHR$(0):
S$=S$+R$+R$+R$+R$+R$+R$+R$+R$
60 FORT=1T08:A=ASC(MID$(S$,T,1)):
IFA=95THENA=13
70 POKED+255+F*8+T,A
80 NEXTT,F
99 END
100 H=ASC(LEFT$(M$,1)):H1=(H-48)
*16:IFH>57THENH1=(H-55)*16
110 H=ASC(RIGHT$(M$,1)):H2=(H-48
):IFH>57THENH2=(H-55)
120 M=H1+H2
130 RETURN
200 DATA AD,8D,02,29,04,F0,28,A5
,C5,C5,FB,F0,22,C9,40
210 DATA F0,1E,85,FB,C9,20,10,1B
,0A,0A,0A,AA,A0,00,BD
220 DATA 00,FF,C9,00,F0,09,99,77
,02,C8,E8,C0,08,D0,F0
230 DATA 84,C6,4C,BF,EA,0A,0A,0A
,AA,A0,00,BD,00,FF,C9
240 DATA 00,F0,EE,99,77,02,C8,E8
,C0,08,D0,F0,18,90,E2
250 DATA A9,00,8D,14,03,A9,FF,8D
,15,03,60
300 DATA "","","","","",""
310 DATA "■","■",?FRE(0)←,SYS,OP
EN
320 DATA "",RESTORE←,RUN,GOSUB,C
ONT←
330 DATA RETURN←,"",PEEK,END←,NE
XT
340 DATA READ,SPC(,CHR$,INPUT#,R
UN←
350 DATA# "",LIST,VERIFY←,STEP,ST
OP,PRINT,INPUT
360 DATA "",LIST←,LOAD,THEN,TO
370 DATA PRINT#,"",?TIME$←,"",SA
VE
380 DATA FOR,DATA,TAB(,ASC,IF
390 DATA ?STATUS←,POKE,CLOSE,CLR
←,REM
400 DATA GET,GOTO,WAIT,GET#,""
410 DATA "","","","","■","■",CMD
420 REM ************
421 REM *START ADD.=*
422 REM *PAGE*256+75*
423 REM *  TO STOP  *
424 REM * RUN  STOP *
425 REM *   AND    *
426 REM *  RESTORE  *
427 REM ************
READY.
```

Screen Dump

L W Tomlin,
New Southgate,
London.

THE IMPLEMENTATION of RS-232 on Interface 1 is fairly good, for printers at least, but it can be quite a tricky business to transfer the screen to it. The machine-code routine here will do this by adding two new commands.

First of all type the numbers in the hex dump into the hex-loader provided, stopping with "*".

Then save the code with

SAVE *"M";1;"copycode" CODE 32768,213

That done enter

OPEN# 3;"B":FORMAT "B",x

where x is the correct baud rate for your printer. Now enter

RANDOMIZE USR 32768

and you have two new commands at your disposal.

The first one is Copy $ which will send a compacted picture of the screen to the printer. The second Copy # gives a picture twice this size and is ideal for cassette covers, etc. The routine is fully relocatable so if you loaded the code to 40000 then type

(continued on next page)

(continued from previous page)

RANDOMIZE USR 40000

to set up the new commands. The routine must not go into the printer buffer as it uses this itself.

The routine works with any printer that uses Epson-type control codes such as the cheap Brother range. Make sure that the "B" channel has been opened before calling the code. It can take quite a while to print the screen at the lower baud rates but only takes about a minute at higher speeds.

The hex loader.

```
  10 DEF FN h(h$)=16*(CODE h$(1)
-48-(7 AND h$(1)>"9"))+CODE h$(2
)-48-(7 AND h$(2)>"9")
  20 INPUT "Start ";s
  30 INPUT "Finish ";f
  40 FOR n=s TO f STEP 8
  50 LET tot=0: PRINT n;": ";
  60 INPUT h$: PRINT h$;
  70 LET x=0
  80 FOR b=1 TO LEN h$ STEP 2
  90 LET z=FN h(h$): LET tot=tot
+z
 100 POKE n+x,z
 110 LET h$=h$(3 TO ): LET x=x+1
 120 NEXT b
 130 PRINT " = ";: INPUT t: PRIN
T t
 140 IF tot<>t THEN PRINT "input
 error - try again": GO TO 50
 150 NEXT n
 160 REM enter STOP to stop
```

Header program.

```
   5 OPEN #3,"b": FORMAT "b",960
0
  10 CLEAR 32767
  20 LOAD ""CODE 32768
  30 RANDOMIZE USR 32768
  40 CLS
  50 PRINT ''''        'COPY $' and
'COPY #'"'"'          are now avai
lable"
```

Hex dump.

```
32768: 210C0009E5CF31E1  =  764
32776: 22B75CC9FE31C2F0  =  1247
32784: 013E4B325CD720    =  703
32792: 00FE23280AFE24C2  =  823
32800: F0013E4C32B05CD7  =  912
32808: 2000CDB7053E03D7  =  705
32816: 01163E1BD710003E  =  405
32824: 41D710003E04D710  =  593
32832: 003E0DD710003E0A  =  378
32840: D710000600E00DD   =  472
32848: 21005B79CB3F6F78  =  742
32856: E6300F6778E60E07  =  767
32864: 070707B56F78E601  =  684
32872: 0707B4F64067C506  =  810
32880: 08E516003E084E58  =  495
32888: CB391D20FBCB1224  =  829
32896: 3D20F37ADD7700DD  =  1019
32904: 23E110E5C10C0C79  =  843
32912: FE4038BFC53E1BD7  =  1066
32920: 10003AB05CD71000  =  573
32928: AFD710003E01D710  =  700
32936: 0021005B06007ED7  =  471
32944: 10002310F93E0DD7  =  606
32952: 10003E0AD71000C1  =  512
32960: 040478FE3038863E  =  682
32968: 1BD710003E32D710  =  601
32976: 00C3C10500000000  =  393
```

Key Helper

Colin Newcombe,
Sudbury,
Suffolk.

Amstrad

THIS PROGRAM defines most of the keys, A-Z, to print whole Basic keywords without affecting the numeric keypad. The program uses less than 1K of memory.

In the CPC-464 User Guide, there is a paragraph of key defining which tells you very briefly about the numeric keypad which can be used as function keys — this makes 12 function keys, key numbers from 128-139.

The other 20 function keys are not mentioned and are left out of the user guide. The program which I have written uses these 20 and leaves the numeric keypad alone so it can be used as normal because many people use the keypad for entering Data than using the normal top row number keys.

I have made it as easy as possible to remember which key prints which keyword. The keywords are called by pressing Control and a Key:

A = AFTER	L = LOCATE
B = BORDER	M = MODE
C = CHR$(	N = NEXT
D = DATA	P = PRINT
E = ELSE	R = RETURN
F = FOR	S = SYMBOL
G = GOSUB	T = THEN
H = HEX$(	U = UPPER$
I = INKEY$	V = VAL(
K = KEY	W = WHILE

As you can see, it is very easy to remember which keywords each key prints. If this sounds complicated then I suggest you sell your micro! I have tried to use the most commonly used keywords. All of the keys can be reset to normal by:

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Using this very short program you can speed up programming and make typing in listings easier and much quicker. ■

```
 100 REM *****************
 110 REM *** Key Helper ***
 120 REM * Colin Newcombe *
 130 REM ***** 3-6-85 *****
 140 REM * Software File. *
 150 REM *****************
 160 REM
 170 REM - Loop to define KEYS -
 180 REM
 190 FOR big.key%=140 TO 159
 200  READ message$,letter$,key.number%
 210  lower%=ASC(LOWER$(letter$))
 220  upper%=ASC(UPPER$(letter$))
 230  KEY DEF key.number%,1,lower%,upper%,big.key%
 240  KEY big.key%,message$
 250 NEXT big.key%
 260 REM
 270 REM - DATA for key defining -
 280 REM
 290 DATA "AFTER ",A,69,"BORDER ",B,54
 300 DATA "CHR$(",C,62,"DATA ",D,61
 310 DATA "ELSE ",E,58,"FOR ",F,53
 320 DATA "GOSUB ",G,52,"HEX$(",H,44
 330 DATA "INKEY$",I,35
 340 DATA "KEY ",K,37,"LOCATE ",L,36
 350 DATA "MODE ",M,38,"NEXT",N,46
 360 DATA "PRINT ",P,27
 370 DATA "RETURN",R,50,"SYMBOL ",S,60
 380 DATA "THEN",T,51,"UPPER$",U,42
 390 DATA "VAL(",V,55,"WHILE ",W,59
```

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The event more properly known as the British Music Fair takes place from July 30-August 4 (first three days trade only) at Olympia 2. Organised by Philbeach Events, London. Telephone 01-385 1200.

Info North

The Information Technology and Office Automation Exhibition takes place at Belle Vue, Manchester from September 17 to September 19. Open to the general public, more details available from BED Exhibitions, 44 Wallington Square, Wallington, Surrey. Telephone 01-647 1001.

In line with defence cuts, Sinclair Spectrums (bought from the warehouses of old microcomputer distributors which have gone bust) are now controlling Britain's first-strike capability. Not entirely true, as the picture above shows Westland Hleicopters supremo Dr Jones demonstrating a special presentation version of Durell software's Combat Lynx to Major General Goodman of the Army Air Corps.

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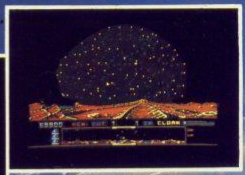

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